Exhibit 44

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

IN RE THE BEAR STEARNS COMPANIES, INC. SECURITIES, DERIVATIVE, AND ERISA LITIGATION	:	Master File No.: 08 M.D.L. No. 1963 (RWS)
This Document Relates To: Securities Action, No. 08 Civ. 2793 (RWS)	:	ECF Case
BRUCE S. SHERMAN, Plaintiff, v. BEAR STEARNS COMPANIES INC., JAMES CAYNE, WARREN SPECTOR and DELOITTE & TOUCHE LLP, Defendants.	:	Index No.: 09 Civ. 8161 (RWS)
VIVINE H. WANG, Plaintiff, v. THE BEAR STEARNS COMPANIES LLC, J.P.MORGAN SECURITIES LLC; J.P.MORGAN CLEARING CORP., DELOITTE & TOUCHE LLP, ALAN D. SCHWARTZ, ALAN C. GREENBERG, JOEY ZHOU, and GARRETT BLAND, Defendants.	:	Index No.: 11 Civ. 5643 (RWS)

EXPERT REPORT OF RENÉ M. STULZ

HIGHLY CONFIDENTIAL

Table of Contents

I. Qualifications

1. I hold the Everett D. Reese Chair in Money and Banking at The Ohio State University. I am also Director of the Dice Center for Research in Financial Economics at The Ohio State University and a Research Associate of the National Bureau of Economic Research in Cambridge, Massachusetts. Since receiving my Ph.D. in Economics from the Massachusetts Institute of Technology in 1980, I have taught at the Massachusetts Institute of Technology, the University of Rochester, the University of Chicago, and The Ohio State University. I was a Bower Fellow at the Harvard Business School from 1996 to 1997.
2. I am an expert in financial economics. I am a past president of the American Finance Association, a fellow of the American Finance Association and of the Financial Management Association, and a past president of the Western Finance Association. I received a Doctorate Honoris Causa from the University of Neuchâtel in Switzerland and the Risk Manager of the Year award from the Global Association of Risk Professionals. I have also been recognized by a number of organizations for my contributions to financial economics by awards or by invitations to be a keynote speaker. I belong to the editorial boards of more than ten academic and practitioner publications. I was editor of *The Journal of Finance* for 12 years and co-editor of the *Journal of Financial Economics* for five years. These are two of the top three journals in the field of financial economics. Thomson Reuters has included me in the 2014 list of the world's most influential scientific minds. I serve on the board of directors of Banque Bonhôte as well as on the board of trustees of the Global Association of Risk Professionals. I have been a consultant for the International Monetary Fund, the World Bank, the New York Stock Exchange, the Federal Reserve Bank of New York, and various corporations and law firms. I have published more than 60 articles on issues in financial economics, authored a textbook on derivatives and risk management, co-authored a book on financial reform, and edited several books.
3. My risk management credentials include the following. I have (a) taught risk management for many years to MBA students and to executives, (b) written a textbook on risk management, (c) written academic studies that are highly cited in the

field of risk management including one that is viewed as seminal, (d) consulted on issues of risk management, and (e) been selected as Risk Manager of the Year, awarded by the Global Association of Risk Professionals. In addition, I am responsible for a worldwide certification examination for risk managers given in more than 50 countries and with more than 40,000 registrants this year; am a trustee and a member of the executive committee of the leading global association of risk managers (GARP); and am chair of the Global Risk Forums organized by GARP together with various central banks to bring together senior risk managers and senior regulators.

4. A copy of my curriculum vitae is attached as Appendix A, which includes a list of my publications over the last ten years. Appendix B contains a list of my testimony over the last four years.

II. Summary of Allegations and Assignment

5. I have been asked by counsel for The Bear Stearns Companies Inc. ("Bear Stearns" or "the Company"), The Bear Stearns Companies LLC, J.P. Morgan Securities LLC, J.P. Morgan Clearing Corp., and the individual defendants to review and comment on certain opinions and analyses in the expert report of Dr. John D. Finnerty dated March 2, 2015 ("Finnerty Report") that relate to Bear Stearns's risk management practices between December 14, 2006 and March 14, 2008 ("Relevant Period").

6. The Complaint filed by Mr. Bruce S. Sherman ("Mr. Sherman" or the "Plaintiff") alleges that Bear Stearns overstated the quality of its risk management.[1] Dr. Finnerty opines that "the various reports, letters — including the 2005 SEC Letter, the 2007 FSA Letter, the 2007 SEC Letter and the subsequent Bear Stearns response letter — the Wyman reports, the 2008 OIG Report, deposition testimony... and Bear Stearns's internal email communications, demonstrate that Bear Stearns: (1) knew since at least 2005 that its mortgage derivatives models and its VaR [Value at Risk] models needed to undergo a thorough review and be updated, as did Bear's risk management operations; (2) that Bear Stearns nonetheless failed to complete a review of its mortgage derivative models before it collapsed in March 2008; (3) that Bear Stearns had not and did not regularly evaluate and enhance its VaR models so as to ensure

[1] *See* Bruce S. Sherman v. Bear Stearns Companies Inc., et al., 09 CIV 8161 (S.D.N.Y.), September 24, 2009, ¶ 3.

that they accurately measured risk of loss; (4) that Bear Stearns had not and did not timely update the inputs to its VaR models; and (5) that Bear Stearns's public statements about its valuation models and procedures… were false and misleading."[2]

7. Dr. Finnerty also opines that Bear Stearns's stock price declined during the period between December 20, 2007 and March 13, 2008 and also on March 14, 2008 and March 17, 2008, and that such declines were "substantially caused by a series of revelations of the facts regarding Bear Stearns' risk management deficiencies and deteriorating financial condition, especially related to Bear Stearns's worsening liquidity situation."[3]
8. The documents and data considered in this report are listed in Appendix C. I also interviewed Michael Alix, the former Chief Risk Officer of Bear Stearns.
9. The analyses and opinions expressed in this report are my own. I am being compensated for my time and services at my regular hourly rate of $900. I have been assisted in this matter by staff of Cornerstone Research, who worked under my direction. I receive compensation from Cornerstone Research based on its collected staff billings for its support of me in this matter. Neither my compensation in this matter nor my compensation from Cornerstone Research is in any way contingent or based on the content of my opinions or the outcome of this or any other matter.
10. My work on this matter is ongoing and I reserve the right to supplement my opinions should I become aware of additional facts or information.

III. Summary of Opinions

11. Dr. Finnerty claims that Bear Stearns's risk management was deficient, that the Company allegedly misrepresented and omitted material information regarding its risk management practices, and that these and other alleged misrepresentations and omissions "explain how fraud caused Bear Stearns's collapse."[4] In this report, I show that Dr. Finnerty has not performed the analyses that would allow him to formulate opinions about whether Bear Stearns had risk management deficiencies during the Relevant Period, that any such alleged deficiencies led to its eventual collapse, or that

[2] Finnerty Report, ¶ 161.
[3] Finnerty Report, ¶¶ 11(c), 281.
[4] Finnerty Report, ¶¶ 134, 161.

its disclosures about risk management were incorrect or misleading. Consequently, I find his opinions unfounded and speculative.

12. Dr. Finnerty's method of relying on quotes from documents, emails, and deposition testimony loosely connected to VaR or other risk management topics as his sole evidence of Bear Stearns's alleged risk management deficiencies is fundamentally flawed for the following reasons:
    a) He has not performed any independent analysis of Bear Stearns's risk management practices;
    b) He fails to analyze the industry norms and has not shown that Bear Stearns's risk management practices were inconsistent with industry norms or whether deviations from industry norms constitute material deficiencies in risk management;
    c) He fails to establish that alleged deficiencies were in effect during the Relevant Period and ignores clear evidence that certain alleged deficiencies were either resolved or not in effect during the Relevant Period;
    d) He fails to demonstrate that the alleged deficiencies played a role in the collapse of Bear Stearns; and
    e) He fails to demonstrate that the alleged deficiencies made Bear Stearns's disclosures materially inaccurate or misleading.

13. Dr. Finnerty ignores a basic principle in finance that there is a tradeoff between risk and return so that taking more risk has the benefit of a greater expected return but at the cost of a greater potential for losses. To create wealth for shareholders, investment banks have to take risks, some of which may not work out and may result in losses. The fact that a risk does not work out does not mean that risk management is deficient.
14. The outcome of the risk taking of Bear Stearns was dramatically affected by the financial crisis that almost brought down the U.S. financial system and this outcome is not by itself evidence that Bear Stearns's risk management was deficient.
15. Dr. Finnerty fails to identify the extent to which the collapse of Bear Stearns was due to risks that were voluntarily taken and publicly known, i.e., risks that did not work out, partly or totally because of an unexpected and unprecedented financial crisis, and the extent to which that collapse was due to alleged deficiencies in risk management.

Since it is quite possible that the collapse of Bear Stearns was due entirely to risks voluntarily taken and disclosed that did not work out, the fact that Bear Stearns collapsed cannot by itself be indicative of alleged deficiencies in risk management or of the alleged fraud. Risk management cannot anticipate all possible future outcomes nor can it quantify all types of risks that a bank is exposed to. The fact that unexpected adverse outcomes occur is not an indication of deficiencies in risk management.

16. Dr. Finnerty ignores that the role of the risk management function in investment banks is not to eliminate or minimize risk. Rather, the role of that function is to help management control, monitor, and understand the amount of risk taken by the bank. A bank with good risk management may choose to pursue strategies that have a large amount of risk. Importantly, the decision to take large risks is a business decision that is defined by a bank's risk appetite. A bank's top management and its board choose the risk appetite that they believe will create value for the shareholders. The risks that Bear Stearns was willing to take were disclosed, so that investors who were not comfortable with these risks had ample opportunities to sell their shares or attempt to change management or its policies.

17. Even assuming that Dr. Finnerty is correct that Bear Stearns's risk management practices were deficient, it does not follow, and he has not shown, that these alleged deficiencies materially affected the decisions made by Bear Stearns's management or, more generally, led to Bear Stearns's collapse. For example, Dr. Finnerty argues that there were flaws in Bear Stearns's models. He has not shown that these alleged flaws were such that they made the disclosures by Bear Stearns inaccurate or misleading. Further, he has not performed any analysis to show that, had these alleged deficiencies not existed, Bear Stearns would not have collapsed during the unprecedented and unanticipated financial crisis of 2007–2008 ("crisis of 2007–2008" or "crisis").[5] In fact, Dr. Finnerty ignores that the nature of the run on Bear Stearns

[5] The origins and evolution of the crisis have been described and debated in detail in several books and articles and the most salient features of the crisis are well known *See e g*, Brunnermeier, M , 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives* Its unprecedented and unanticipated nature has been widely commented on by regulators and prominent economists *See e g*, Greenspan, A , "Never Saw it Coming Why the Financial Crisis Took Economists by Surprise," *Foreign Affairs*, November/December 2013, ("In the run-up to the crisis, the Federal Reserve Board's sophisticated forecasting system did not foresee the major risks to the global economy Nor did the model developed by the International Monetary Fund, which concluded as late as the spring of 2007 that 'global economic risks [had] declined' since September 2006 and that 'the overall U S economy is holding up well [and] the signs elsewhere are very encouraging '")

was such that it could have collapsed even in the absence of any alleged deficiency in risk management.

18. Dr. Finnerty discusses extensively what he views to be flaws in one risk measurement tool used by Bear Stearns, its VaR model. However, all his criticisms of the VaR model are based on third party comments. He has failed to conduct his own analysis of Bear Stearns's VaR model at even the most superficial level. His criticisms of Bear Stearns's VaR model appear to reflect a misunderstanding of how VaR models work. For example, Dr. Finnerty has not taken into account the fact that the inherent limitations of VaR models generally used by banks (e.g., that such models are backward looking and do not fully capture the risk of rare events) were well understood, that VaR was never intended to and never did provide a complete view of the risks of a firm's assets, and that Bear Stearns used other tools like scenario analysis or stress testing in risk management.

19. In addition, Dr. Finnerty fails to take into account that risk management practices evolve over time in response to, for example, market conditions, changes in regulations, technological advancements, and financial innovation. Criticisms of risk management and improvements in risk management in response to these criticisms are to be expected with any financial institution, including Bear Stearns. Dr. Finnerty does not distinguish between criticisms that are par for the course in external evaluations of risk management, suggestions that are made because a firm tries to improve its risk management practices, and criticisms that would indicate serious systemic problems.

IV. The role of risk management in investment banks.

20. In this section I discuss the nature of risk-taking in investment banks and explain the distinction between the business decision to take risks and the risk management function to help manage those risks. Though Dr. Finnerty claims that alleged deficiencies in Bear Stearns risk management, in part, led to the collapse of Bear Stearns,[6] he does not define what he means by risk management. To create wealth for shareholders, investment banks have to take risks, some of which will not work out.

[6] *See* Finnerty Report, ¶¶ 134–135, 197

The decision to take risks is a business decision that is defined by a bank's risk appetite. A bank's top management and its board choose the risk appetite that they believe will create value for the shareholders. To measure, monitor, and help manage risks, investment banks have risk management functions that perform a set of tasks. To perform these tasks, risk management functions use a set of tools. Many of Dr. Finnerty's specific criticisms of risk management refer to the tools used by the risk management function at Bear Stearns. However, in his criticisms, he does not perform any analysis to show how the tools used by Bear Stearns differed from the tools typically used in the industry and does not establish a standard against which Bear Stearns's risk management tools can be evaluated. He also fails to account for the fact that the performance of these tools was affected by an unexpected and unprecedented financial crisis.

A. Risk-taking in investment banks.

21. Investment banks engage in a wide range of activities. For instance, they make markets for securities, buy and sell large blocks of securities for customers, design and underwrite securities, help customers obtain financing, advise on mergers and acquisitions, arrange for securities lending, manage assets for high net worth individuals and institutional investors, and provide a wide range of services to hedge funds and other asset managers.[7]
22. To succeed at these activities, investment banks have to be able to hold securities on their balance sheets. Many of these securities are purchased in their market-making function or through their underwriting function. Investment banks will hold these securities on their own balance sheets until the securities can be resold.[8]
23. Funding is required to hold these securities. Investment banks obtain funding through equity, equity-like securities, and debt, but also through large amounts of short-term debt that is often collateralized by the securities.[9] Given this nature of their funding,

[7] Iannotta, G , 2010, *Investment Banking A Guide to Underwriting and Advisory Services* Springer-Verlag Berlin Heidelberg, pp 3-6, Stowell, D , 2010, *An Introduction to Investment Banks Hedge Funds and Private Equity*, Elsevier Inc , pp 109, 118

[8] Iannotta, G , 2010 *Investment Banking A Guide to Underwriting and Advisory Services* Springer-Verlag Berlin Heidelberg, p 4, Stowell, D , 2010, *An Introduction to Investment Banks Hedge Funds and Private Equity*, Elsevier Inc , p 98

[9] Stowell, D , 2010, *An Introduction to Investment Banks Hedge Funds and Private Equity*, Elsevier Inc , p 98, Martel, M et al , 2012, "Business Models of International Banks in the Wake of the 2007-2009 Global Financial Crisis," *Banco de Espana Revista de Estabilidad Financiera*, No 22, pp 108-110

investment banks tend to be highly levered. This was especially the case in 2006 and 2007. This leverage was publicly disclosed by Bear Stearns.[10] For example, according to its 10-K filing for fiscal year 2007, Bear Stearns disclosed a gross leverage ratio of 32.8 indicating that it had 32.8 times more assets than it had equity.[11,12]

24. The leverage of Bear Stearns was a choice the bank made in 2007 that was fully disclosed. When Bear Stearns's stock price fell in the fall of 2007, its board authorized share repurchases, likely reflecting its view that the stock was undervalued.[13] Share repurchases reduce the amount of a firm's equity and increase its leverage. The Company's decision to repurchase shares was publicly disclosed and applauded by some analysts, as well as by Mr. Sherman himself. For instance, Fox-Pitt Kelton stated on October 5, 2007 that "Bear Needs Less Capital, Not Infusion."[14] Mr. Sherman, the Plaintiff in this matter, also wanted Bear Stearns to repurchase shares at the time.[15] Further, in the following quarter, Bear Stearns executives stated that they did not want to raise more equity.[16] The decision not to raise more equity was a business decision that affected the risks of Bear Stearns, but that decision was disclosed and discussed publicly, so that any shareholder uncomfortable with that decision could decide to sell or hedge his shares.

25. To be able to operate, investment banks also need to maintain a relatively high credit rating since otherwise counterparties might not be willing to transact with them. All investment banks in 2007 had credit ratings of either A or AA.[17] To have both high

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[10] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, pp 46–47, Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, pp 52–53 There are different measures of leverage and for the purpose of a simple illustration, the measure used here is assets over equity capital Bear Stearns's gross leverage ratio, as disclosed in its Form 10-K filings, is calculated as total assets divided by the sum of shareholders' equity, preferred equity, and trust preferred equity

[11] Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 53

[12] Gross leverage is just one approach to measuring a bank's capital position (*See, e g* Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 46, Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 52) Leverage by itself cannot be used to compare risk across banks because, among other reasons, banks have assets that differ in risk As a result, a bank with lower leverage could be substantially more risky than a bank with more leverage if the former has riskier assets In addition, banks can hedge assets and the extent to which hedges are in place can differ across banks As assets are hedged more, the risk of the bank falls as long as hedges perform as expected

[13] "Q3 2007 Bear Stearns Earnings Conference Call," September 20, 2007, Transcript

[14] "BSC Insights From Post-3Q07 Investor Day," *Fox-Pitt Kelton Cochran Caronia Waller Analyst Report*, October 5, 2007

[15] Deposition Testimony of Bruce S Sherman, December 16, 2014, pp 269 7–11, 284 14–17, 381 9–13

[16] "Q4 2007 Bear Stearns Earnings Conference Call," December 20, 2007, Transcript

[17] For example, in 2007 Bear Stearns and its peers all had credit ratings of either A or AA, a typical rating of investment banks *See* Bloomberg, Stulz, R , 2014, Governance, Risk Management, and Risk-Taking in Banks," *Forthcoming in Economic Policy Review*, Federal Reserve Bank of New York pp 5–6 The notation I use is the one used by Standard & Poor's With Standard & Poor's, the highest rating is AAA Moody's highest rating is written Aaa The ratings of investment banks by the two main rating agencies were similar

leverage and high credit ratings at the same time, investment banks had to manage their risks well. They used hedging extensively to reduce the risks of their assets.[18]

26. To hedge means to construct a portfolio of financial instruments such that the addition of these instruments to the portfolio of securities to be hedged produces a portfolio that is less risky than the original portfolio.[19] Consider an investment bank that holds a portfolio of residential mortgage-backed securities ("RMBS") backed by subprime collateral. Investment banks, such as Bear Stearns, held such securities in their inventory because they issued, underwrote, and traded such securities.[20] To hedge that portfolio, Bear Stearns could take a short position in the ABX index, which is effectively an equal-weighted index of subprime RMBS.[21] An investor with a short position in the index would make a profit when the index falls. Consequently, by holding a short position in the index, Bear Stearns would make a profit on its hedge if the value of its RMBS holdings were to decline. As the composition of the ABX index may not necessarily match the composition of the bank's RMBS portfolio, this hedge may not completely eliminate the risk of the portfolio. Nevertheless, this hedge reduces the risk of this portfolio of securities since it would at least partly offset a loss in value of the RMBS portfolio if such a loss were to occur.[22]

27. Bear Stearns's primary business activities were not to buy and hold securities on its balance sheet for the long-term.[23] It acquired securities with the intent to resell them

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[18] *See e g* "The Bear Stearns Companies Inc to Web Cast Its Investor Education Day Transcript," April 13, 2005 ("[I]t is the policy of the firm that we are mandated to hedge our positions it is not optional ") Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, pp 17, 61, 70 94, 99, 119, Goldman Sachs Form 10-K for FY 2007, filed on January 29, 2008, 23, 86–87, Lehman Brothers Form 10-K for FY 2007, filed on January 29, 2008, pp 10, 22, 58, 62, 65, Merrill Lynch Form 10-K for FY 2007, filed on February 25, 2008, pp 25, 57, 59, 64, Morgan Stanley Form 10-K for FY 2007, filed on January 28, 2008, p 86

[19] Stulz, R , 2003 *Risk Management and Derivatives* Thomson South-Western~~, 2003,~~ pp 5, 649 ("A hedge is a financial position put on to reduce the impact of a risk one is exposed to ", "the use of financial instruments or of other tools to reduce exposure to a risk factor ") *See also* Stulz, R "Governance, Risk Management, and Risk-Taking in Banks," *Forthcoming in Economic Policy Review*, Federal Reserve Bank of New York

[20] Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 101 *See also* Goldman Sachs Form 10-K for FY 2007, filed on January 29, 2008, p 77, Lehman Brothers Form 10-K for FY 2007, filed on January 29, 2008, p 104, Merrill Lynch Form 10-K for FY 2007, filed on February 25, 2008, p 35, Morgan Stanley Form 10-K for FY 2007, filed on January 28, 2008, p 52

[21] "Bear Stearns Analyst Meeting," October 4, 2007, Transcript ("We also had the advent of the sub-prime indices, what is commonly referred to as ABX trading These were very useful for hedging purposes "), "Markit ABX HE Index Rules," Markit, September 5, 2008

[22] This example serves as a reminder that gross leverage is only one metric used in assessing a bank's risk As such, it cannot be used as a stand-alone measure of risk To see this, in the example above, while both the RMBS holdings and the short position in the ABX index would appear as assets on the balance sheet, rising (falling) values of RMBS holdings would be offset by a falling (rising) value of the ABX index short position As a result, the overall impact of underlying changes in the RMBS price would have a muted effect Accordingly, the bank's positions in the example may be considered *less* risky than a hypothetical position with a lower gross leverage consisting of only RMBS holdings, without the hedge using the ABX index

[23] Bear Stearns's primary activities were to make markets, underwrite securities, and provide financing to its customers Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 3

—it was a financial intermediary, not an investor, and did not intend to take long-term views on markets.[24] To reduce the risks of the securities it held, it hedged extensively.[25] For example, Bear Stearns stated that its "core risk management practices are disciplined hedging of market risks and stress based margining of secured financing positions."[26] Other investment banks functioned largely in the same way.[27]

28. But neither hedging nor the intent to buy assets only to resell them could eliminate entirely the risks of the assets held by investment banks. Hedges may fail and markets can become less liquid so that reselling assets would become harder. However, these risks were publicly disclosed and well-understood by market participants.[28]

29. Because some investment banks relied extensively on short-term funding, they were also at risk of being unable to roll that funding over, i.e., of not being able to replace the maturing funding with new funding.[29] To mitigate this risk, they held cash and other highly liquid assets that they could sell quickly if they had funding difficulties. However, leading up to 2007, some investment banks such as Bear Stearns had grown in their reliance on overnight repurchase agreements to fund the purchase of their assets.[30] As such, there was a significant maturity mismatch on their balance sheets where a substantial fraction of the assets was funded by overnight repurchase agreements, which resulted in a need to roll over a substantial portion of their funding on a daily basis.[31] An investment bank that was unable to roll over its short-term

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[24] *See e g* "The Bear Stearns Companies Inc to Web Cast Its Investor Education Day," April 13, 2005, Transcript

[25] *See* "The Bear Stearns Companies Inc to Web Cast Its Investor Education Day," April 13, 2005, Transcript ("[I]t is the policy of the firm that we are mandated to hedge our positions it is not optional ")

[26] *See* "Bear Stearns Responds to S&P Action," August 3, 2007, Transcript

[27] *See e g* Goldman Sachs Form 10-K for FY 2007, filed on January 29, 2008, pp 87, 99, Morgan Stanley Form 10-K for FY 2007, filed on January 28, 2008, pp 77, 86

[28] *See e g* Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008 p 17 "We are an underwriter and market-maker for, residential and commercial mortgages, U S agency-backed mortgage products, asset-backed securities and CDOs We purchase and originate commercial and residential mortgage loans of varying quality The markets for these instruments remain extremely illiquid and as a result, the valuation of our CDOs and subprime related exposures is complex and involves a comprehensive process, including the use of quantitative modeling and management judgment Valuation of these exposures will also continue to be impacted by external market factors, including default rates, rating agency actions, and the prices at which observable market transactions occur Our ability to mitigate our exposures by selling or hedging our exposures is also limited by the market environment " *See also* "Upgrade to Buy on valuation," Merrill Lynch Analyst Report, January 11, 2008, p 3, "U S Securities Industry With Valuations Testing Lows, Is It Time to Get into the Brokers? NO!" Bernstein Research Analyst Report, March 10, 2008, p 2

[29] Brunnermeier, M , 2009, "Deciphering the Liquidity and Credit Crunch 2007 – 2008," *Journal of Economic Perspectives*, Vol 23, No 1, pp 79–80

[30] Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, pp 18, 49, 82, 94

[31] "In a repo contract [or repurchase agreement], a firm borrows funds by selling a collateral asset today and promising to repurchase it at a later date " Brunnermeier, M , 2009, "Deciphering the Liquidity and Credit Crunch 2007 – 2008," *Journal of Economic Perspectives*, Vol 23, No 1, p 80

funding would need to find another source of funding fairly quickly. However, the extent of a bank's reliance on short-term funding and its funding risks were generally publicly disclosed and understood by market participants.[32]

30. This type of risk that I have just described is called roll-over risk or funding liquidity risk.[33] Investment banks are also exposed to another type of liquidity risk called asset liquidity risk or market liquidity risk. This type of risk arises when the market for the securities that investment banks hold becomes illiquid.[34]

31. Investment banks profit from the spread between the return on their assets and the cost of their funding. If Bear Stearns only held risk-free assets, for example, its funding cost would have been low, but not below the risk-free rate, so it would not have been able to survive, much less earn profits for its shareholders.

32. In general, before the crisis, investment banks believed that taking risks in the form of higher leverage was in the interest of their shareholders and they purchased additional assets via debt financing rather than equity issuance.[35] However, this also meant that investment banks were more fragile in that a small loss relative to their assets could make them insolvent. This was publicly known.[36]

B. Risk appetite and risk management.

33. To manage their risks, investment banks specified how much risk they were willing to take. In other words, they set a risk appetite. Some investment banks, such as Bear Stearns, publicly discussed their risk taking in terms of risk appetite.[37] In finance, it is generally understood that there is a tradeoff between risk and return. One way to understand the risk appetite of a bank is that it specifies how that bank trades off risk and return.

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[32] *See, e g*, "Higher Costs are Also a Headwind," UBS Investment Research, February 28, 2008, p 4, "U S Securities Industry With Valuations Testing Lows, Is It Time to Get into the Brokers? NO!" Bernstein Research Analyst Report, March 10, 2008, p 2, Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, pp 18, 49

[33] More generally, roll-over risk or funding liquidity risk is at times referred to simply as "liquidity risk"

[34] Brunnermeier, M , 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," Journal of Economic Perspectives, Vol 23, No 1, p 92

[35] Adrian, T , and H Shin, 2010, "The Changing Nature of Financial Intermediation and the Financial Crisis of 2007–2009," *Annual Review of Economics*, Vol 2, 607–608

[36] "U S Securities Industry With Valuations Testing Lows, Is It Time to Get into the Brokers? NO!" Bernstein Research Analyst Report, March 10, 2008, pp 5–6

[37] *See, e g*, "Q4 2005 Bear Stearns Earnings Conference Call," December 15, 2005, Transcript ("No change in risk appetite"), "Q1 2006 Bear Stearns Earnings Conference Call," March 16, 2006, Transcript ("There is no material change in our risk appetite"), "Q2 2006 Bear Stearns Earnings Conference Call," June 15, 2006, Transcript ("No, it doesn't reflect any change in our market risk appetite here at all")

34. The determination of the risk appetite in an investment bank was an important business decision that top management made together with the board of directors.[38] Investment banks often discuss their risk appetite with the investment community because their expected performance in normal times is typically believed to be higher when they have a higher risk appetite.[39] Investors paid attention to information about a bank's risk appetite.[40] They did so for Bear Stearns.[41] Bear Stearns's risk appetite was discussed publicly by its executives and assessed by analysts, so that investors were aware of it and willingly bore the associated risks.

35. For an investment bank, the determination of its risk appetite is a critical business decision. With high risk appetite, the investment bank can grow faster, be more profitable, and become larger if its risk-taking activities are successful. However, with any risk taking, there is always some chance of adverse outcomes in which the bank will incur losses and could be at risk of failing.

36. It is useful to consider a simple example to understand the concept of risk appetite. Suppose a bank has a choice between two strategies. One strategy, the high-risk strategy, has a 95% chance of making a gain of $100 million and a 5% chance of making a loss of $400 million, which could result in the bank's failure. The other strategy, the low-risk strategy, has a 95% chance of making a gain of $20 million and a 5% chance of losing $20 million. With the high-risk strategy, the expected gain is $75 million.[42] With the low-risk strategy, the expected gain is $18 million.[43] Moreover, undertaking either strategy can be in the interest of its shareholders. In this example, if the investment bank has a high risk appetite, it makes the business decision to take the high-risk strategy.

37. When an investment bank chooses a strategy, it does not know whether the chosen strategy will turn out well or not. Its outcome depends on, for instance, how markets evolve. No bank has perfect foresight to know how markets will evolve and any

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[38] Stulz, R , 2014, "Governance, Risk Management, and Risk-Taking in Banks," *Forthcoming in Economic Policy Review*, Federal Reserve Bank of New York, p 9

[39] Ross, S , et al , 2005, *Corporate Finance*, McGraw-Hill Irwin, 8th Ed , pp 307–309

[40] Barnes, R , "Evaluating Risk Appetite A Fundamental Process of Enterprise Risk Management," *Standard & Poors*, October 31, 2006

[41] *See, e g* "Q1 2006 Bear Stearns Earnings Conference Call," March 16, 2006, Transcript ([D]oes that suggest anything about changing the firm's risk appetite or anything?"), "Q2 2006 Bear Stearns Earnings Conference Call," June 15, 2006, Transcript ("Can you talk a little bit about whether the growth in some of the trading areas -- fixed income, capital markets in particular -- relate to any change or increase in risk appetite ?")

[42] 0 95 multiplied by $100 million less 0 05 multiplied by $400 million

[43] 0 95 multiplied by $20 million less 0 05 multiplied by $20 million

strategy will be accompanied by some risk. The management of the firm reviews the risk and makes an assessment of which strategy is in the best interest of the shareholders based on the information they have at the time. In choosing the high-risk strategy, there is always a possibility that the bank will incur a large loss and potentially fail. However, in the example above, given a high risk appetite and the information available at the time the decision is made, the high-risk strategy may be the optimal choice for the bank's shareholders.

38. With this example, whether or not the bank fails has nothing to do with risk management. The risk-taking decision is whether to take the high-risk strategy or the low-risk strategy. With a high risk appetite, the investment bank might decide that it is better for its shareholders to take the high-risk strategy because its expected payoff is so high that it outweighs the adverse consequences of incurring the loss. Alternatively, with a low risk appetite, the investment bank could conclude that the markets might react adversely to the bank taking a high level of risk, and that the potential costs of such an adverse reaction make taking this risk disadvantageous for the shareholders.

39. To make an informed decision, management has to use the available tools in an effort to understand the risks of each strategy. To help management understand and manage risks, investment banks typically have a person who oversees the risk management function.[44] For example, during the Relevant Period, the Chief Risk Officer ("CRO") of Bear Stearns was Michael Alix.[45] Typically, when analysts, market participants, or employees refer to risk management they refer to the risk management function of a firm. The role of this function is to measure, monitor, and help those who manage risks.[46] In my report, unless explained otherwise, I use "risk management" to refer to a risk management function's role in helping the management control, monitor, and understand the amount of risk taken. Importantly, risk management in an investment bank does not have the role of minimizing risk or eliminating risk. If it did, investment banks could not function as they have to take risks to succeed.

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[44] Stulz, R , 2014, "Governance, Risk Management, and Risk-Taking in Banks," *Forthcoming in Economic Policy Review*, Federal Reserve Bank of New York, pp 12–13

[45] BEAR 01250204–79 at 04

[46] Stulz, R , 2014, "Governance, Risk Management, and Risk-Taking in Banks," *Forthcoming in Economic Policy Review*, Federal Reserve Bank of New York, pp 12–13 *See* Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 68 ("The Company has established various management committees that have responsibilities for monitoring and oversight of its activities and risk exposures ")

40. In the simple example above, risk management would help management understand the risks of each strategy. Management then chooses the desired strategy based on its risk appetite and the expected gain of the strategy. In this context, there could be a risk management deficiency if the risk management function fails to take reasonable steps to assist management in assessing the risk of the alternative strategies. However, if the bank made the business decision to take the high-risk strategy, the realization of a large loss does not mean that the bank had a risk management deficiency if the risk of that strategy was reasonably assessed when the decision to take that risk was made. There was always some chance that the bank would incur a large loss with the high-risk strategy, i.e., even without any deficiencies in risk management, future outcomes are unpredictable.[47] Importantly, realized outcomes may be affected by unexpected developments, such as the unprecedented crisis of 2007–2008. Investors in Bear Stearns stock could not reasonably believe that risk managers at Bear Stearns had the ability to anticipate risks that risk managers at other banks failed to anticipate, such as the occurrence of a financial crisis whose severity had no precedent in the world of modern investment banking.

41. After the crisis started, top executives had to make business decisions in the face of considerable uncertainty. Asset prices became very volatile.[48] As I discuss below, events that were not previously observed in the financial markets began to occur frequently. Financial pricing relationships that investment banks had relied on to hedge risks broke down.[49] In making business decisions, top executives had to judge how the crisis was going to evolve. They did not have perfect foresight so that their judgments might, without the benefit of hindsight, turn out to be wrong and have led to unintended outcomes.

42. It is also important to note that in the context of the example above, a deficiency in risk management might not have any impact on the firm's decision and its subsequent evolution. To see this, suppose in the example that risk management incorrectly

[47] For the purpose of illustration, the example that I use is highly stylized. The financial crisis of 2007–2008 serves as a reminder that unexpected and unprecedented outcomes can occur regardless of the strategy taken by a firm.

[48] The volatility of oil prices, treasury notes, and U.S. equities all started to climb in 2007 and all reached their all-time peak in late 2008. "CBOE 10-Year Treasury Note Volatility Futures," CBOE, http://research.stlouisfed.org/fred2/series/VXTYN, "CBOE Volatility Index: VIX," CBOE, https://research.stlouisfed.org/fred2/series/VIXCLS/, "CBOE Crude Oil ETF Volatility Index," CBOE, https://research.stlouisfed.org/fred2/series/OVXCLS.

[49] *See* Levich, R., 2011, "Evidence on Financial Globalization and Crises: Interest Rate Parity," *New York University Working Paper*; Mitchell, M. and T. Pulvino, 2011, "Arbitrage crashes and the speed of capital," *Journal of Financial Economics*; Stulz, R., 2010, "Credit default swaps and the credit crisis," *Journal of Economic Perspectives*, Vol. 24, No. 1, pp. 73–92.

assesses that a large loss is less likely than what it would have assessed had there been no deficiencies in risk management. In this case, it is possible that, had the true likelihood of the large loss been known, the investment bank would still have taken the high-risk strategy. In this situation, the incorrect assessment of the likelihood of the large loss would not have affected the evolution of the firm. In contrast, the incorrect assessment of the likelihood of a large loss could have had material consequences for shareholders if the investment bank would have made a different decision had it known the correct likelihood of the large loss.

43. Dr. Finnerty has performed no analysis and offered no evidence that the alleged deficiencies in Bear Stearns's risk management led to an incorrect assessment of potential losses and thus led Bear Stearns to pursue strategies it would not have pursued otherwise. In other words, Dr. Finnerty has not demonstrated that, had the alleged deficiencies not existed, Bear Stearns's management would have made different business decisions such that Bear Stearns would not have collapsed.

C. The organization and tools of risk management.

44. In 2007, three principal risks focused on by risk management in investment banks were market risk, credit risk, and operational risk.[50] Market risk is the risk associated with rate or price changes for traded financial instruments.[51] Credit risk is the risk that counterparties and borrowers will not make promised payments.[52] Operational risk is the risk that mistakes and mishaps will take place, for instance, due to failures of people and processes or external events.[53]

45. A large fraction of the assets held by investments banks were financial instruments that were valued at the end of each day using estimates of market values. This process is called marking to market.[54] For instance, if an investment bank held a

[50] *See* Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 68, Goldman Sachs Form 10-K for FY 2007, filed on January 29, 2008, p 85, Lehman Brothers Form 10-K for FY 2007, filed on January 29, 2008, p 85, Merrill Lynch Form 10-K for FY 2007, filed on February 25, 2008, p 60, Morgan Stanley Form 10-K for FY 2007, filed on January 28, 2008, p 83 *See also* BEAR 01250204–79 at 05, 17, 24 and 52

[51] Stulz, R , 2003, *Risk Management and Derivatives*, Thomson South-Western, p 650 Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 69

[52] Stulz, R , 2003, *Risk Management and Derivatives*, Thomson South-Western, p 647 Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 74

[53] Stulz, R , 2003, *Risk Management and Derivatives*, Thomson South-Western, p 650 Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 76

[54] Stowell, D , 2010, *An Introduction to Investment Banks, Hedge Funds and Private Equity The New Paradigm*, Elsevier Inc , p 97

share of IBM, the market value of that share would fluctuate daily. At the end of each day, the investment bank would record a gain or a loss depending on how the price of the share changed that day. For equity securities traded on the New York Stock Exchange, marking to market was a straightforward task. On the other hand, if the financial instrument was not traded in a highly liquid market, then marking to market would involve judgment as well as model risk if a model was used to value the instrument.[55]

46. To understand its risk, an investment bank would identify sources of risk that are material, which are called risk factors.[56] Once these sources are identified, the investment bank would measure its exposure to these risk factors.[57] For instance, a bank with a portfolio of stocks might identify the return on a broad stock market index as a risk factor. It would then estimate how the value of its portfolio would change when the value of the broad stock market index changes—this would be its measure of exposure.[58] Finally, it would measure the uncertainty associated with the risk factor as a more uncertain risk factor could lead to larger unexpected outcomes.[59]

47. One measure (out of a number of other measures) of risk for traded assets that is commonly used by investment banks is VaR.[60] VaR is best understood by an example. Suppose that an investment bank reports a VaR of $100 million at the 5% probability level. What this means is that on a given day, the investment bank has a 5% chance of making a loss in excess of $100 million and a 95% chance of making a loss of less than $100 million.[61] [62]

48. As I will discuss in more detail later, VaR has many limitations. To start with, VaR is a forecast and forecasting is often more of an art than a science so that there is no simple step-by-step manual that risk managers can follow. The estimation of VaR

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[55] Model risk captures the risks associated with the use of a model These risks include, for instance, the possibility that the model is flawed or that inputs in the model have mistakes *See also* Jorion, P , 2007, *Value at Risk*, McGraw-Hill, p 26
[56] Stulz, R , 2003, *Risk Management and Derivatives* Thomson South-Western, p 10
[57] Jorion, P , 2007, *Value at Risk*, McGraw-Hill, pp 277–278
[58] Jorion, P , 2007, *Value at Risk*, McGraw-Hill, pp 277–278
[59] Stulz, R , 2003, *Risk Management and Derivatives*, Thomson South-Western, pp 87–89
[60] *See* Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 69, Goldman Sachs Form 10-K for FY 2006, filed on February 6, 2007, p 91, Lehman Brothers Form 10-K for FY 2006, filed on February 13, 2007, p 60, Merrill Lynch Form 10-K for FY 2006, filed on February 26, 2007, p 51, Morgan Stanley Form 10-K for FY 2006, filed on February 12, 2007, p 95, *See also* "Bond volatility threatens banks' Value at Risk models " *Financial Times*, June 3, 2013 VaR is not limited to measuring the risk of traded assets and can also be used to estimate the risk of non-traded assets
[61] A more technical definition is that VaR is the maximum loss for a given statistical confidence level (in my example, the statistical level is 95%)
[62] Stulz, R , 2003, *Risk Management and Derivatives*, Thomson South-Western, p 81

relies on a sizeable number of simplifying assumptions, including assumptions whose validity and implications are often very difficult to assess. The calculation of VaR always involves a tradeoff between precision and computational efficiency because the one-day VaR generally used by banks is useful only for a day, until the next day's VaR becomes available. VaR was never intended to, and never did, provide a complete overview of the risks of a firm's traded assets. Banks used stress tests extensively to better understand their risks. A stress test evaluates the performance of the bank's assets under a specific scenario. For instance, a bank might use a stress test to estimate how much it would lose if the crisis of 1998, when Russia defaulted and markets went into a tailspin, were to repeat itself.[63]

49. A bank's overall risk results from the actions of many risk takers throughout the bank. It is therefore important for banks to make sure that as a result of these actions, its risk level remains consistent with its risk appetite. A critical tool used to monitor risk-taking is to set limits. Investment banks generally have a very extensive system of limits. These limits are imposed on individual traders, trading desks, and aggregated entities such as departments.[64]

50. Limits can be formulated in many different ways. Typically, there will be a limit for VaR. However, there could be additional limits. For instance, a trading desk in Treasury bonds could also have a limit for the interest sensitivity of its net position and a limit for losses if some specific stress event took place.[65]

51. These limits further show that risk management is not about minimizing risk or eliminating risk. Investment banks want their traders to take risks as they cannot make profits otherwise. Limits are a monitoring tool and do not generally correspond to a threshold that can never be exceeded. If a limit is exceeded, the firm has to decide whether positions have to be changed so that the limit will be respected or an exception will be allowed.[66] As one goal of risk management is to monitor risks and not to minimize or eliminate risks, limits can also be changed as circumstances change.

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[63] *See e g* BEAR 01251995–2012 at 2000, in which "Russia/LTCM 1998" is listed as one of nine different historical stress scenarios run by Bear Stearns

[64] Holton, G , 2014, *Value-at-Risk Theory and Practice*, second edition, e-book at http //value-at-risk net, Section 1 5 *See e g* BEAR 00714173, which lists risk limits at all levels for Bear Stearns, and BEAR 01250204–79 at 41–42, 74

[65] Bear Stearns had an extensive system of limits during the Relevant Period, including VaR limits and stress loss limits at the firm and division or desk levels *See e g* BEAR 00714173, BEAR 01250204-79 at 40-42

[66] Bear Stearns had rules regarding how to set limits as well as who would have the authority to decide who could exceed limits *See e g* BEAR 00714173, BEAR 01250204-79 at 40-42

52. While banks use many quantitative tools to measure and monitor risk, quantitative tools by themselves are not enough. Quantitative tools tend to rely on past history. When past history is a poor predictor of future risks, different types of analysis are required. In this case, analysis of hypothetical scenarios is typically used.[67]

53. According to documents I reviewed in this matter, Bear Stearns adopted a risk management function or "risk governance" framework that was headed by the CRO.[68] Various "Risk Groups" such as "Market Risk," "Credit Risk," and "Operational Risk" reported to the CRO.[69] Each of the Market, Credit, and Operational Risk Groups were responsible for the assessment, measurement, and monitoring of market, credit, and operational risks, respectively.[70] These groups used various tools including but not limited to P&L, VaR, limits, and scenario analyses.[71] The CRO reported directly to the Executive Committee which was "the most senior management committee" at Bear Stearns.[72] In the fall of 2007, in response to the departure of Warren Spector,[73] the Company adopted a Risk Policy Committee that was chaired by the CRO and its members consisted of business heads and top management, including the Executive Committee.[74] The Risk Policy Committee engaged in weekly discussions of the bank's trading positions and trading results, including an "in depth dialogue of the firm's risk strategy."[75] These weekly discussions were an "[e]volution of the firm's longstanding Monday risk meeting[s]."[76]

V. If Dr. Finnerty is correct that Bear Stearns's risk management practices were deficient, it does not follow and he has not shown that the alleged deficiencies caused the collapse of Bear Stearns.

54. From my reading of Dr. Finnerty's report, he appears to agree that Bear Stearns suffered a run on the bank when he states that Bear Stearns's prime brokerage clients

[67] Bear Stearns conducted several hypothetical stress scenarios *See e g* BEAR 02007919–29 at 22
[68] BEAR 01250204-79 at 06, 13, 16
[69] BEAR 01250204-79 at 14
[70] BEAR 01250204-79 at 17–20
[71] BEAR 01250204-79 at 17–20
[72] BEAR 02034870-75 at 71 Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 65
[73] Mr Spector was Co-President and Co-Chief Operating Officer of Bear Stearns from 2001 until August 2007 Bruce S Sherman v Bear Stearns Companies Inc , et al , 09 CIV 8161 (S D N Y), September 24, 2009, ¶ 20
[74] BEAR 01250204-79 at 08 As is normal in any organization, governance structures, processes, and procedures change In Section VII, I discuss the transition in Bear Stearns's risk management function in late 2007 in more detail
[75] BEAR 01250204-79 at 08
[76] BEAR 01250204-79 at 08

"made a 'run on the bank.'"[77] However, he argues that such a run on the bank was the "foreseeable consequence" of Bear Stearns's allegedly undisclosed liquidity problem,[78] and he concludes that Bear Stearns's liquidity problems were "primarily caused by its use of inadequate risk management models and practices."[79]

55. I explain in this section that this conclusion is unsupported in the Finnerty Report and does not follow as a matter of economics. First, I show that the combination of certain features of Bear Stearns's funding and business activities—all of which were publicly known—made the bank particularly susceptible to liquidity problems during the unprecedented crisis of 2007–2008. Next, I point out that mere rumors can trigger bank runs. Dr. Finnerty ignores that a run on the bank could have occurred even in the absence of the alleged risk management deficiencies and even if all the liquidity decisions were the right ones from the perspective of shareholders at the time. Last, I show that Dr. Finnerty has neither demonstrated nor provided any evidence that absent the alleged deficiencies in Bear Stearns's risk management, Bear Stearns's liquidity problems would not have occurred and the firm would not have collapsed.

A. The run on Bear Stearns.

56. Bear Stearns was the smallest and least diversified of the large U.S. investment banks, with a significant exposure to mortgage-related assets.[80] The fact that Bear Stearns's global operations were relatively small and that it was much more focused on mortgage-related businesses than its peers was publicly known.[81] Given these characteristics of Bear Stearns's business operations, market participants were aware that a financial crisis that originated in the subprime mortgage markets would have a greater impact on Bear Stearns as its activities in these markets were more important

[77] Finnerty Report, ¶ 32
[78] Finnerty Report, ¶ 255
[79] Finnerty Report, ¶ 237
[80] *See* Brunnermeier, M., 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives*, Vol. 23, No. 1, p. 88, *See e.g.* "Lowering Estimates and Target," Deutsche Bank Analyst Report, February 28, 2008. Unless otherwise noted, when I refer to major investment banks I am referring to Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley.
[81] *See, e.g.* "Bear Stearns' Outlook Remains Negative on FY'07 Earnings," Fitch Ratings, December 21, 2007. ("Fitch believes financial performance in 2008 will remain challenging given Bear Stearns' scale of its fixed income business and more limited international scope.") *See also* "Lowering estimates and price target," Deutsche Bank Analyst Report, December 20, 2007, p. 2. ("Deterioration in the mortgage market specifically could affect Bear more than peers as we estimate ~15% of revenue is mortgage related vs. less than 10% at Lehman and less than 5% at the others.")

relative to its other activities than they were to other firms.[82]

57. During the week of March 10, 2008, the last week before the announcement of its acquisition by JPMorgan Chase ("last week" hereafter), it is uncontested that Bear Stearns suffered a dramatic run on the bank. This run had three main dimensions:

a) First, as already discussed, Bear Stearns relied significantly on secured short-term funding. By March 2008, much of that funding was overnight collateralized funding.[83] During the last week, Bear Stearns's overnight lenders increasingly withdrew their funding and were not willing to roll it over. This meant that Bear Stearns had to find other lenders or use its own cash to fund itself.

b) Bear Stearns was active in derivatives trading.[84] With derivatives trades, counterparties have to post collateral, often in the form of cash, in order to support their trades.[85] This collateral provided a source of funds for Bear Stearns. In the last week, Bear Stearns's derivative counterparties started moving their trades away from Bear Stearns to safeguard their collateral, which depleted the cash available to Bear Stearns.[86]

c) Bear Stearns had a large prime brokerage business.[87] Such a business provides services and financing to hedge funds and other clients. Prime brokerage clients deposit funds at their prime broker as well as post collateral for trades with their prime broker. Some of the funds held by its prime brokerage clients provided funding to Bear Stearns. During the last week, Bear Stearns's prime brokerage clients moved their business to other banks, which also depleted the cash available to Bear Stearns.[88]

58. Even though its cash holdings at the beginning of the last week were significantly

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[82] *See, e g ,* "Lowering Estimates and Target," Deutsche Bank Analyst Report, February 28, 2008 ("Given Bear's higher exposure to the softening mortgage market and less diversification (by product and region) than peers, we believe Bear should trade at a discount to its five-year average multiple ")

[83] Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, pp 82, 94, Bear Stearns Form 10-Q for 1Q 2008, filed on April 14, 2008, p 5

[84] Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 32

[85] Stulz, R , 2003, *Risk Management and Derivatives*, Thomson South-Western, p 132

[86] Brunnermeier, M , 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives*, Vol 23, No 1, p 88 , Testimony before the Committee on Banking, Housing, and Urban Affairs United States Senate April 3, 2008, pp 24, 26

[87] Bear Stearns had revenue of $4 6 billion in 2007, and its prime brokerage business had revenue of $1 2 billion, approximately 26% of revenue Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, pp 43, F-3

[88] Testimony before the Committee on Banking, Housing, and Urban Affairs United States Senate April 3, 2008, pp 23–26

higher compared to its normal holdings,[89] Bear Stearns eventually ran out of cash as a significant share of its assets lost funding in the overnight repo market.[90]

59. Because of these three dimensions of the run on the bank during its last week, Bear Stearns lost effectively all of its liquid funds.[91] In highly liquid asset markets, a bank that loses funding can quickly sell assets that it can no longer fund. However, in March 2008, asset markets were not highly liquid and Bear Stearns held a large amount of assets that could not be sold rapidly without a substantial discount, i.e. at a fire sale price. If assets cannot be funded, selling assets at fire sale prices can quickly render a bank undercapitalized and possibly insolvent.[92]

B. A run on the bank can occur because of irrational rumors.

60. To understand the mechanics of bank runs, it is best to consider a commercial bank (depository institution) before some deposits were insured. Suppose that a bank has assets of $100 million, deposits of $90 million, and equity of $10 million. Suppose further that the bank's assets include $20 million of cash and highly liquid securities and $80 million of loans that cannot be called prior to maturity.[93] Generally, depositors care about being able to convert their deposits into cash whenever they want. Under normal conditions, any individual depositor of this bank would experience no difficulty with converting deposits into cash. However, if all depositors

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[89] In the first week of March, Bear Stearns had $21 billion of liquid assets On one day, March 13th, the liquid assets at Bear Stearns fell from $12 4 billion to $2 billion Testimony before the Committee on Banking, Housing, and Urban Affairs United States Senate April 3, 2008, pp 25–26

[90] Brunnermeier, M , 2009 "Deciphering the Liquidity and Credit Crunch 2007 – 2008," *Journal of Economic Perspectives*, Vol 23, No 1, p 88, Testimony before the Committee on Banking, Housing, and Urban Affairs United States Senate April 3, 2008, pp 23–26

[91] *See* Testimony before the Committee on Banking, Housing, and Urban Affairs United States Senate, April 3, 2008, pp 12–13 ("What happened to Bear Stearns during the week of March 10th was likewise unprecedented For the first time, a major investment bank that was well-capitalized and apparently fully liquid experienced a crisis of confidence that denied it not only unsecured financing, but even short-term secured financing And even when the collateral consisted of Treasuries and agency securities which had a market value in excess of the funds to be borrowed Counterparties would not provide securities lending services and clearing services Prime brokerage clients moved their cash balances elsewhere These decisions, in turn, influenced others to also reduce their exposure to Bear ")

[92] *See* "Opening Remarks of Ben S Bernanke Reflections on a Year of Crisis," August 10–11, 2009 ("In repo agreements, the asset being financed serves as collateral for the loan, and the maximum amount of the loan is the current assessed value of the collateral less a haircut In a crisis, haircuts typically rise as short-term lenders attempt to protect themselves from possible declines in asset prices But this individually rational behavior can set off a run-like dynamic As high haircuts make financing portfolios more difficult, some borrowers may have no option but to sell assets into illiquid markets These forced sales drive down asset prices, increase volatility, and weaken the financial positions of all holders of similar assets, which in turn increases the risks borne by repo lenders and thus the haircuts they demand This unstable dynamic was apparent around the time of the near-failure of Bear Stearns in March 2008, and haircuts rose particularly sharply during the worsening of the crisis in mid-September As we saw last fall, when a vicious funding spiral of this sort is at work, falling asset prices and the collapse of lender confidence may create financial contagion, even between firms without significant counterparty relationships In such an environment, the line between insolvency and illiquidity may be quite blurry ")

[93] Callable in this context means the lender can compel the borrower to repay the principal before the maturity date

demanded their deposits simultaneously, the bank would be unable to meet its obligations. Suppose that depositors hear of a rumor that the bank is running out of cash. Deposits could become very risky if the rumor is true. Once the bank has paid $20 million of cash, deposits will be backed by highly illiquid assets and the bank will default. In this situation, any depositor who hears of the rumor will want to convert his deposits into cash as quickly as possible, and any depositor who is slow in doing so will get no cash in the off-chance that the rumor is correct. Furthermore, such an outcome can occur even if there is no basis for the rumor. [94]

61. Bear Stearns was not a commercial bank. However, the mechanics of the run that led to its collapse are the same as a run on a commercial bank. Consider a lender that made a one-day loan to Bear Stearns. If the lender heard a rumor and thought that Bear Stearns would run out of cash the next day, it would not make sense for this lender to renew the loan because he has a very a significant downside risk that the loan will not be repaid back the next day. The lender would instead withdraw funding from Bear Stearns and, if the rumor turned out to be incorrect, it could resume lending to Bear Stearns.

62. Mere rumors can start a bank run.[95] In 2008, it was widely believed by observers and employees of Bear Stearns that rumors played a considerable role in its collapse.[96] Mr. Sherman appeared to believe that view when he stated that "[i]t was a rumor created mugging."[97] Dr. Finnerty also states in his report that during the last week, there were rumors swirling in the capital markets regarding the liquidity and capital adequacy of Bear Stearns.[98]

63. The three business conditions I described above, namely, Bear Stearns's reliance on short-term funding, its significant activities in derivatives trading, and the fact that it had a large prime brokerage business, made Bear Stearns particularly susceptible to a debilitating run in March 2008. Even Dr. Finnerty acknowledges that "Bear Stearns experienced severe liquidity problems during the Relevant Period and was exposed to

[94] For a full explanation of bank runs, *see* Diamond, D and P Dybvig, 1983, "Bank runs, deposit insurance, and liquidity," *Journal of Political Economy*, Vol 91 No 3 *See also* Foley-Fischer, N et al , 2015, "Self-fulfilling Runs Evidence from the U S Life Insurance Industry," *Federal Reserve Board of Governors Working Paper*

[95] He, Z and A Manela, 2014, "Information Acquisition in Rumor-Based Bank Runs," *Forthcoming in Journal of Finance*

[96] "Fears, Rumors Touched Off Fatal Run on Bear Stearns," *The Wall Street Journal*, May 28, 2008, *see* Deposition Testimony of Alan Schwartz, December 9, 2014, pp 111 6-25, 113 15–114 22, 115 14–120 11 *See also* Foley-Fischer, N et al , 2015, "Self-fulfilling Runs Evidence from the U S Life Insurance Industry," *Federal Reserve Board of Governors Working Paper*

[97] Deposition Testimony of Bruce S Sherman, December 16, 2014, pp 434 10–435 8

[98] Finnerty Report, ¶ 35

a high risk of financial failure due to its heavy reliance on short-term repurchase financing."[99] What Dr. Finnerty ignores is that having this type of funding was a business decision made by Bear Stearns's management and this was publicly disclosed.[100] It was also disclosed that there was some probability that funding disruptions could occur.[101]

64. Dr. Finnerty has not shown that at the time when Bear Stearns made its funding decisions, it made decisions that were different from what it would have made had the alleged deficiencies in risk management not existed. The fact that there was a bank run is not evidence that Bear Stearns had an inappropriate liquidity policy because of the alleged deficiencies in risk management. In fact, there is nothing in Dr. Finnerty's report that shows that the disclosed holdings of liquid funds by Bear Stearns were not the amounts that were best for shareholders given the information available at the time. Furthermore, Dr. Finnerty fails to establish that the alleged risk management deficiencies of Bear Stearns were in effect during the Relevant Period, and even assuming that the alleged deficiencies were in effect, he has not demonstrated that Bear Stearns made incorrect financial decisions as a result of these alleged deficiencies.

C. The collapse of Bear Stearns could have occurred even if it had none of the alleged deficiencies in risk management.

65. As discussed earlier, adverse outcomes are always possible with risk-taking activities. Given its risk appetite, Bear Stearns had to take risks to create wealth for its shareholders.[102] As a result, adverse outcomes due to the risks it was taking were always possible. The fact that Bear Stearns collapsed does not in itself indicate that it had deficiencies in its risk management because many risk-taking activities involve some probability of an adverse outcome that could lead to the collapse of a firm.

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[99] Finnerty Report ¶ 171

[100] *See* Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 68 ("The Global Finance Committee is composed of senior managers from Corporate Treasury, Fixed Income Finance, Equity Finance, and Controllers The Global Finance Committee monitors the firm's liquidity, sets funding policies and strategies, coordinates funding activities to ensure integrity with policies and cost efficiency, and monitors balance sheet and capital usage ") It was also publicly known that Bear Stearns relied significantly on secured short-term funding, particularly through collateralized through repurchase agreements (repo financing) *See also* Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 82

[101] Bear Stearns disclosed that "[l]iquidity risk could impair our ability to fund operations and jeopardize our financial condition [o]ur ability to borrow in the debt markets also could be impaired by factors that are not specific to us " Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 18

[102] "The Company's principal business activities engender significant risks " *See* Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 65

66. Importantly, given its leverage and funding policies—which were publicly disclosed—Bear Stearns could have collapsed even if risk management had none of the alleged deficiencies. For example, as discussed in Section IV, given its leverage, a decline in its asset value could be sufficient to put Bear Stearns in financial distress. This was a known risk.[103] As markets became more turbulent during the crisis, the probability of such a small asset value decline increased substantially and, hence, so did Bear Stearns's probability of financial distress. Importantly, since these policies were publicly disclosed and widely commented on by analysts, shareholders who were uncomfortable with such policies could sell their shares or attempt to change management or the policies that management followed.[104]

67. During the crisis, a highly levered financial institution such as Bear Stearns could have reduced its risk of financial distress to what it was in more normal times (e.g., pre-crisis) by reducing its leverage. This could be accomplished in several ways, including selling assets to repay debt. However, as I explained earlier, selling assets is costly when markets have become less liquid since in such markets prices have to be discounted to attract buyers, which reduces the benefit of selling assets.[105] Alternatively, a financial institution could issue equity to reduce its leverage. However, new equity might have to be issued only at a low price to attract investors, which would have been costly for the existing shareholders. Because of these issues, financial institutions could decide that the best strategy is to not sell assets or issue new equity. Such a decision was a business decision and it would not preclude the risk that the institution might not be able to live through the turbulent times. If the financial institution did not survive, it was not because it had deficient risk management but rather because it made a business decision to take a risk and that risk did not work out.

68. The main elements of Bear Stearns's response to the crisis were fully disclosed and well-known. In the beginning of the crisis in 2007, Bear Stearns disclosed that it met

[103] An increase of leverage increasing the riskiness of equity is a classical result in financial theory Modigliani, F and M Miller, 1958, "The Cost of Capital, Corporation Finance and the Theory of Investment," *The American Economic Review* Vol 48, No 3, p 271

[104] "Upgrade to Buy on Valuation" Merrill Lynch Analyst Report, January 11, 2008, p 6 "BSC | Bernstein Looks at Credit and Profitability Reducing 2007-08 EPS Estimates & Price Target," Bernstein Research Analyst Report, July 16, 2007 pp 1, 26

[105] Brunnermeier, M , 2009 "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives*, Vol 23, No 1, p 92

regulatory capital requirements[106] and was repurchasing shares instead of issuing new equity.[107] In late 2007 as the crisis worsened, it also noted that selling assets was "quite challenging" given the market environment so that it was not possible or economical for Bear Stearns to reduce its leverage rapidly by shrinking its balance sheet.[108] Heading into the first quarter of 2008, Bear Stearns also disclosed that, in order to cope with adverse developments in its funding, it had increased its liquidity pool and increased its secured funding, which was considered to be more reliable, relative to unsecured funding.[109] Hence, it was publicly known that Bear Stearns was a highly-levered firm trying to weather an unprecedented storm.[110]

D. Even if Bear Stearns's risk management had deficiencies, Dr. Finnerty has not shown that these deficiencies materially affected the decisions of management or, more generally, led to the collapse of the firm.

69. Dr. Finnerty, with the benefit of hindsight, appears to argue that Bear Stearns should have had lower leverage and more liquidity.[111] At the time, Bear Stearns's leverage and liquidity were publicly known and there was no consensus that Bear Stearns should have lower leverage and higher liquidity. On the contrary, even at the beginning of 2008, some analysts thought that Bear Stearns should have less equity, and analysts observed that "[l]iquidity has been managed well and is ample."[112] Dr. Finnerty has not shown that the choices management made with respect to leverage and liquidity were materially affected by the alleged deficiencies in risk management.

70. The risk management deficiencies that Dr. Finnerty alleges concern mainly risk management tools and practices.[113] Though Dr. Finnerty claims there are many such alleged deficiencies, he provides no evidence or analysis showing that, as a result of these alleged deficiencies, Bear Stearns acted differently than it would have acted absent these alleged deficiencies or that its disclosures were different than what they would have been otherwise.

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[106] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 55
[107] Bear Stearns pursued a $1 billion share buyback in 2007, an indication that its stock was attractively priced *See* "Q3 2007 Bear Stearns Earnings Conference Call," September 20, 2007, Transcript
[108] "Bear Stearns at Merrill Lynch Banking and Financial Services Investor Conference," November 14, 2007
[109] Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 48
[110] "Bear Stearns Analyst Meeting," October 4, 2007, Transcript
[111] *See, e g*, Finnerty Report ¶¶ 169–170, 182 and 196
[112] *See e g*, "BSC Insights From Post-3Q07 Investor Day," Fox-Pitt Kelton Analyst Report, October 5, 2007, "Fitch Bear Stearns's Outlook Remains Negative on FY'07 Earnings," Fitch Ratings, December 21, 2007
[113] Finnerty Report ¶¶ 134, 135, 138, 140–144, 150–153, 155

71. For example, one of the deficiencies that Dr. Finnerty alleges, based on a statement in a letter from the Financial Services Authority ("FSA") in 2007 ("2007 FSA Letter"), is that some of Bear Stearns's models were not well-documented.[114] As an initial matter, Dr. Finnerty has not provided independent evidence that this was the case. Even assuming that models were not well-documented, he has not shown that the models were deficient or how they were deficient. Additionally, Dr. Finnerty has not shown that this alleged lack of documentation led management at Bear Stearns to misunderstand the firm's risk in such a way that, without the misunderstanding induced by the poor documentation, Bear Stearns would have had lower leverage and more liquidity. Finally, even if better documentation would have led to lower leverage and more liquidity, Dr. Finnerty has not shown that lower leverage and additional liquidity—the level and amount of which he does not specify—would have prevented the collapse of Bear Stearns during the last week.

72. Throughout the crisis, various market participants, including Bear Stearns executives, thought that the worst of the crisis was behind them.[115] While it is obvious with the benefit of hindsight that the crisis became much worse after the end of 2007,[116] executives, analysts, and other market participants at the time did not have the benefit of hindsight and assessed the situation differently. For example, some analysts stated at the end of 2007 that "the worst in terms of the fixed-income re-pricing event is over."[117] Such views would have made it less likely for firms to choose to decrease their leverage at great cost to reduce their risk of financial distress.

73. For Dr. Finnerty to allege that Bear Stearns's alleged risk management deficiencies, in part, led to Bear Stearns's collapse, he has to show that the business decisions of Bear Stearns would have been different absent these alleged deficiencies and that this difference in business decisions would have prevented the eventual collapse of Bear Stearns. Dr. Finnerty has not conducted this analysis. He has not shown that, absent

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[114] Finnerty Report ¶ 144(a)

[115] *See, e g*, "BSC Insights From Post-3Q07 Investor Day," Fox-Pitt Kelton Analyst Report, October 5, 2007, "BSC A Year To Forget But Franchise Has Long Term Value," Wachovia, December 20, 2007, "Bear Stearns Analyst Meeting," October 4, 2007, Transcript ("[The fixed income environment] was extremely rare and not seen by any of us in our collective years It was unprecedented, and I don't think we envision the market going forward that we will experience anything like that again ")

[116] Former Federal Reserve Chairman Ben Bernanke stated that "September and October of 2008 was the worst financial crisis in global history, including the Great Depression" *See* "Bernanke 2008 Meltdown Was Worse Than Great Depression," *The Wall Street Journal*, August 26, 2014

[117] "U S Securities Industry | Frequently Asked Questions and Some Uncertain Answers," *Bernstein Analyst Report*, November 7, 2007

these alleged deficiencies, management would have acted differently so that, for instance, Bear Stearns would have been substantially less levered and would have had a substantially larger liquidity reserve to survive the crisis.

74. To illustrate, Dr. Finnerty quotes from the 2008 OIG Report that "Bear Stearns had not and did not regularly evaluate and enhance its VaR models so as to ensure that they accurately measured risk of loss."[118] To claim that the quoted statement is evidence that the alleged risk management deficiency contributed to Bear Stearns's collapse is problematic for several reasons. First, Dr. Finnerty has not independently verified whether this statement was accurate or even applicable during the Relevant Period. Even if it were so, Dr. Finnerty does not explain to what extent he considers Bear Stearns's VaR inaccurate or what the accurate VaR should have been. I cannot tell from the Finnerty Report whether he considers Bear Stearns's VaR too low or too high and by how much. If Dr. Finnerty believes that the VaR was too low because the model had not been regularly evaluated or enhanced, he has not explained why a higher VaR would have been a concern for management given that Bear Stearns's VaR was substantially below the firm-wide VaR limit on the dates I have been able to examine.[119] Finally, Dr. Finnerty has not shown that absent this alleged deficiency, management would have made different decisions regarding leverage and liquidity that would have prevented the collapse of the firm.

VI. Dr. Finnerty's criticisms of Bear Stearns's VaR Model are misplaced and unfounded.

75. In this section, I first explain the basics of VaR models including their application as well as their limitations that were already well known before the crisis. Next, I review Bear Stearns's disclosures of its VaR models and explain that, based on these disclosures, no reasonable investor could have expected Bear Stearns's VaR to be materially affected by rare events such as an unexpected crisis with no parallel in the

[118] Finnerty Report, ¶ 161

[119] I have examined 24 Daily VaR reports—which is all the reports I have seen—that were produced to me covering a period from October 1, 2007 to March 11, 2008 Daily firm-wide VaR averaged 72% of the VaR limit over this period BEAR 01230610–22 at 11, BEAR 01352599–604 at 600, BEAR 02003025–35 at 26, BEAR 02005868–73 at 69, BEAR 02007657–70 at 58, BEAR 02007674–87 at 75, BEAR 02007690–703 at 691, BEAR 02007711–23 at 12, BEAR 02007726–40 at 27, BEAR 02007744–55 at 45, BEAR 02007758–70 at 59, BEAR 02007774–84 at 75, BEAR 02007788–99 at 89, BEAR 02007818–29 at 19, BEAR 02007833–44 at 34, BEAR 02007847–58 at 48, BEAR 02007876–87 at 77, BEAR 02007890–901 at 891, BEAR 02007904–915 at 05, BEAR 02007919–29 at 20, BEAR 02007946–57 at 47, BEAR 02007959–69 at 70, BEAR 02007973–84 at 74, BEAR 02007987–98 at 88

post-World War II economy. Last, in light of how VaR models were used in practice and their relevance to overall risk management at Bear Stearns—both of which Dr. Finnerty ignores—I explain why Dr. Finnerty's criticisms of Bear Stearns's VaR models are unfounded and misplaced.

A. VaR Models in 2007.

76. In Section IV, I introduced the concept of VaR and explained that for a given probability level, VaR represents the loss that has that probability of being exceeded.[120] For example, if the holding period is one day and the probability level is 5%, then the VaR is the loss on a given day that has a 5% chance of being exceeded.[121] Specifically, a one day VaR of $100 million at the 5% probability level means that the bank has a 5% chance of incurring a loss larger than $100 million and a 95% chance of incurring a smaller loss the next day. Alternatively, this means that for one trading day in twenty (5% probability), the bank could be expected to lose more than $100 million. It is important to note that, by definition, VaR does not convey any information about the size of a loss if the loss were to exceed $100 million. In other words, if VaR of $100 million is exceeded, the expected loss could be $101 million or $10 billion or even larger, and there is no way to know which expected loss is correct if one just knows the VaR.
77. VaR was developed in the 1980s at JP Morgan to make it possible for the Chairman at the time, Dennis Weatherstone, and top management to understand the risk that the bank would be exposed to the next day.[122] The strength of VaR is that it provides a single measure of downside risk that can be used at all levels of a financial institution.
78. For a financial institution with a large number of positions, the measurement of VaR is, operationally, extremely challenging. For instance, Lehman Brothers had roughly one million derivatives contracts at the time of its bankruptcy.[123] To estimate VaR, statistical techniques have to be applied so that the risk of all these positions can be combined to produce one VaR number for the firm.[124] To make this feasible, a large

[120] Another definition of VaR is the maximum loss at a given confidence level
[121] Alternatively, the maximum loss at the 95% confidence level
[122] Stulz, R , 2003, *Risk Management and Derivatives*, p 78
[123] "Lehman One Big Derivative Mess " *Bloomberg*, October 7, 2008
[124] Stulz, R , 2014, "Governance, Risk Management, and Risk-Taking in Banks," *Forthcoming in Economic Policy Review*, Federal Reserve Bank of New York, p 17

number of simplifying assumptions have to be made across a variety of asset classes and financial instruments. There are many textbooks and trade books that review approaches to estimate VaR.[125] My review of these books as well as my understanding from discussing the issue with risk managers is that there is no single, universally accepted, best conceptual approach to estimating VaR, much less an accepted approach to deal with many of the practical computational issues that arise when implementing VaR estimation in a large complex firm, such as a major investment bank.

79. The main tool to simplify VaR estimation is called "mapping," a process that assigns a firm's trading positions into coarse bins.[126] For instance, rather than considering the risk of each individual stock held by the firm, a risk manager will group all U.S. stocks in one bin under the assumption that the risk of these stocks is related in a simple way to the risk of the U.S. stock market as a whole. Mapping makes VaR estimation tractable and feasible, however, mapping assumptions can also be a source of significant errors.[127] Furthermore, a mapping that is appropriate at one point in time may no longer be appropriate at a different point in time if market conditions change over time.

80. The most popular approach to estimate VaR among banks is called "historical simulation." In 2006, many large banks and investment banks including Bear Stearns used the historical simulation approach.[128] At its core, this approach assumes that the risk that has been realized in the past provides a good estimate of the risk in the future.[129] This approach simulates the performance of today's positions in financial instruments over the past year or longer. To illustrate, consider a bank that calculates VaR at the 5% probability level for a portfolio of stocks it holds today. For the historical simulation of its VaR, it would calculate what the return on this portfolio would have been for each of the last 250 or so trading days. It would then assume that the VaR is the 13th worst day from that simulation.[130] If this approach were

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[125] *See, e.g.* Jorion, P., 2007, *Value at Risk* McGraw-Hill, Dowd, K., 2005, *Measuring market risk*, John Wiley
[126] Jorion, P., 2007, *Value at Risk*, McGraw-Hill, p. 277
[127] Jorion, P., 2007, *Value at Risk*, McGraw-Hill, p. 301
[128] Lazaregue-Bazard, C., 2010, "Exceptions to the rule," *Risk*, p. 107 In fact, all the major investment banks used this methodology to estimate VaR
[129] Jorion, P., 2007, *Value at Risk*, McGraw-Hill, pp. 264–265
[130] Assuming 250 trading days in a year, a VaR estimated at the 5% probability level would roughly correspond to the 13th worst loss (250 days x 5% which is approximately 13 days)

implemented today, VaR would be small relative to the VaR implemented in January 2009, since the events of the fall of 2008 would lead to a high VaR in the latter case.

81. Nassim Taleb, a vocal critic of VaR who became famous during the crisis, has used an example that makes clear the limitation that arises from using past data to estimate future risk. Consider a turkey in the week before Thanksgiving. It would think that it faces no risk because it has been fed well for a long period of time, so that it has no reason to think that it might not receive enough food. However, shortly thereafter, it will become Thanksgiving dinner, which it could not anticipate based on its historical data.[131]

82. Similarly, the historical data that banks used to estimate VaR in 2007 did not reflect the high volatility in the markets at the time;[132] thus it was difficult for VaR models to perform well. In fact, numerous studies found that VaR models generally performed poorly during the crisis.[133]

83. The limitations of using the historical simulation approach to estimate VaR were well-known even before the crisis.[134] The very nature of rare events is that they do not occur frequently; therefore the historical data may not contain a fair representation of rare risk events. Mr. Taleb made these arguments ten years earlier in 1997, in an interview with the *Derivatives Strategy* magazine. At the time, Mr. Taleb stated that "VaR is charlatanism because it tries to estimate something that is not scientifically possible to estimate, namely the risk of rare events."[135]

84. In light of these well-known limitations of VaR, it is important to recognize that it has been long understood that the VaR that investment banks used to estimate market risks was not designed to capture the risk of rare events, i.e., events that are extremely unlikely to happen in a given year (such as a financial crisis). As I discussed above, the VaR models used by investment banks focused on losses that were expected to be

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[131] "Nassim Taleb and Daniel Kahneman Black Swan Shows Fragility under Heavy Weight of Anchoring," CFA Institute, February 6, 2013

[132] Several extraordinary events occurred in during the financial crisis, which were not in the historical data For a sample of those events, *see* ¶ 91 below

[133] O'Brien, J and P Szerszen, 2014, "An Evaluation of Bank VaR Measures for Market Risk During and Before the Financial Crisis," *Federal Reserve Board Working Paper*, pp 23–24, Kourouma, L et al 2011 "Extreme Value at Risk and Expected Shortfall during Financial Crisis " *Cahier de recherche du CERAG*, p 2

[134] All five investment banks disclosed in their SEC filings the limitations of their VaR Models *See* Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 69, Goldman Sachs Form 10-K for FY 2006, filed on February 6, 2007, p 91, Lehman Brothers Form 10-K for FY 2006, filed on February 13, 2007, p 60, Merrill Lynch Form 10-K for FY 2006, filed on February 26, 2007, p 52, Merrill Lynch Form 10-K for FY 2007, filed February 25, 2008, p 62, Morgan Stanley Form 10-K for FY 2006, filed on February 12, 2007, p 96

[135] "The World According to Nassim Taleb," *Derivatives Strategy*, December 1996/January 1997

exceeded on at most thirteen trading days out of approximately 250 trading days in a given year. With such an approach, "black swan" events—events that had an extremely low likelihood of occurring —would not be reflected in VaR. To see this, consider a VaR calculated using historical simulation over the past 250 trading days (one calendar year). Suppose that this VaR was used to estimate the risk of a portfolio of stocks that represented a portfolio like the Standard & Poor's 500 Index ("S&P 500"), a good proxy for the U.S. stock market. If the worst one-day drop in the S&P 500 in the past 250 trading days was 25% whereas the 13th worst one-day drop was 1%, this portfolio's VaR estimated at the 5% probability level for a one-day horizon would be 1%. By design, the worst one-day loss of 25% over the past year is not reflected in VaR.[136] Moreover, the VaR of 1% does not convey any information about losses greater than 1%.

B. Bear Stearns's VaR disclosures.

85. Bear Stearns disclosed relevant information about its VaR estimates. Importantly, VaR's well-known limitations, i.e., that VaR will be of limited use in predicting rare events due to its reliance on historical data and the use of a pre-specified probability level (e.g., 1%, 5%), were also fully disclosed by Bear Stearns even *before* the Relevant Period.[137]

86. Bear Stearns disclosed that its daily VaR was estimated at a 5% probability level (95% confidence level) based on historical simulation[138] that VaR had important limitations and, even more importantly, that it might not perform well in unusual market conditions:

> VaR has inherent limitations, including reliance on historical data, which may not accurately predict future market risk, and the quantitative risk information generated is limited by the parameters established in creating the models. There can be no assurance that actual losses occurring on any one day arising from changes in market conditions will not exceed the VaR amounts shown below or that such losses will not occur more than once in 20 trading days. VaR is not likely to accurately predict exposures in markets that exhibit sudden

[136] This example also illustrates why a black swan event loss (the 25% one-day drop) could be considerably greater than the VaR estimate (1%)
[137] Bear Stearns Form 10-K for FY 2005, filed on February 22, 2006, p 67
[138] *See* Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 69

> fundamental changes or shifts in market conditions or established trading relationships. Many of the Company's hedging strategies are structured around likely established trading relationships and, consequently, those hedges may not be effective and VaR models may not accurately predict actual results. Furthermore, VaR calculated for a one-day horizon does not fully capture the market risk of positions that cannot be liquidated in a one-day period. However, the Company believes VaR models are an established methodology for the quantification of risk in the financial services industry despite these limitations. VaR is best used in conjunction with other financial disclosures in order to assess the Company's risk profile.[139]

87. Bear Stearns also disclosed its aggregate market risk VaR as well as the VaR for each component of market risk, including interest rate risks (which included changes in yields of financial instruments with credit risks), currency risks, equity risks, and commodity risks.[140] For fiscal year 2006, it reported that the average daily aggregate market risk VaR was $28.6 million.[141] This meant that for one trading day in twenty, Bear Stearns could be expected to lose more than $28.6 million. But this VaR did not and could not convey any information about the size of the loss if a loss were to exceed $28.6 million. Bear Stearns disclosed that during fiscal year 2006, its daily aggregate market risk VaR ranged from $19.0 million to $44.4 million.[142] It also explained that the roughly 40% increase in average VaR from fiscal year 2005 was due to an increase in the equity and fixed income (interest rate) VaRs.[143]

88. Bear Stearns also reported the number of days on which it made losses and the number of days when its losses exceeded average VaR:

> There were 13 daily trading losses for the fiscal year ended November 30, 2006 and 9 daily trading losses for the fiscal year ended November 30, 2005. Daily trading losses never exceeded the reported average VaR amounts during the fiscal years ended November 30, 2006 and 2005.[144]

89. During the second half of 2007, Bear Stearns and other banks disclosed many days on which their trading loss exceeded the average VaR.[145] Bear Stearns's 3Q 2007 10-Q

[139] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 69
[140] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, pp 69–70
[141] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 70
[142] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 70
[143] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 70
[144] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 71
[145] "VaR exceptions reflect volatile season," *Risk Magazine*, November 26, 2007

filing stated that "[t]rading losses experienced in the mortgage-related and leveraged finance areas contributed to the number of daily trading losses" for the quarter.[146] Its 2007 10-K filing stated that "[h]igher market volatility and reduced market liquidity contributed to an increase in the number of trading days with losses, and to higher magnitude daily losses."[147] Reduced liquidity could lead to trading losses when a bank attempts to reduce its risk quickly by selling risky assets that do not trade in a highly liquid market, because the price of the assets has to be discounted to attract buyers, which is something the bank would not have to do if it could take more time to sell.

90. Samuel Molinaro, then Chief Financial Officer ("CFO") at Bear Stearns, in discussing the Company's third quarter results during an October 4, 2007 meeting with analysts, commented on the unprecedented market conditions that affected the effectiveness of their hedging strategies:

> [W]ith really unprecedented moves, you know we talk about when you look at risk management metrics, 95% confidence intervals… These were 20 standard deviation moves in a lot of these markets, so very dramatic moves together with stresses caused in the efficiency of the hedging program with cash products so significantly underperforming derivative products in a variety of different areas.[148]

91. Furthermore, the market conditions in the second half of 2007 were precisely what Bear Stearns described in its 3Q 2007 10-Q filing as conditions that would make VaR perform less well in predicting risk.[149] Those market conditions were characterized by high volatility and the occurrence of events that were extremely unlikely to occur. Examples of such events that occurred in the second half of 2007 include the following:

    a) Sharp spike in Libor in August.[150]
    b) Large number of rating downgrades for CDO and RMBS.[151]

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[146] Bear Stearns Form 10-Q for 3Q 2007, filed on October 10, 2007, p 62
[147] Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 73
[148] "Bear Stearns Analyst Meeting," October 4, 2007, Transcript
[149] Bear Stearns Form 10-Q for 3Q 2007, filed on October 10, 2007, p 60
[150] Brunnermeier, M , 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives*, Vol 23, No 1, p 85
[151] Brunnermeier, M , 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives* Vol 23, No 1, pp 83, 85

c) A rapid drop in the value of AAA-rated securities backed by subprime mortgages in August.[152]

d) Highly unusual movements in stock prices in early August (the so-called quant crisis).[153]

e) The sharp contraction in the asset-backed commercial paper market.[154]

f) The inability of some funds that held subprime assets to reliably price securities, resulting in the suspension of redemptions.[155]

g) The collapse of securitization issuance.[156]

92. All of these events were unexpected in light of the historical data VaR models relied on. Before these events took place, the likelihood of such events occurring did not affect a VaR estimated using the historical simulation method, because such events had not happened during the window used by banks to estimate VaR. Even with a significantly longer window for historical simulation, the black swan events seen during the crisis would not have been observed from looking further back in the past. In summary, it is my opinion that the VaR disclosures of Bear Stearns were such that no reasonable investor could have thought that Bear Stearns's VaR would be affected materially by the possibility of such rare events before they actually occurred.[157]

C. Dr. Finnerty ignores how VaR was estimated at Bear Stearns, how it evolved, and what the industry practice was at the time.

93. Dr. Finnerty has not performed an independent review of Bear Stearns's VaR models. His criticisms of Bear Stearns's VaR models are based solely on a collection of quotes from documents, emails, and deposition testimony loosely connected to the topic. Dr. Finnerty mischaracterizes many of the quotes or does not accurately represent the context from which they are taken. He ignores evidence that suggests certain alleged deficiencies were resolved or were not in effect during the Relevant Period. At the

[152] Brunnermeier, M., 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives* Vol 23, No 1, p 83

[153] Brunnermeier, M., 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives* Vol 23, No 1, p 85

[154] Brunnermeier, M., 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives* Vol 23, No 1, p 84

[155] Brunnermeier, M., 2009, "Deciphering the Liquidity and Credit Crunch 2007–2008," *Journal of Economic Perspectives* Vol 23, No 1, p 84

[156] Rosengren, E., 2009, "Lessons for the Future from the Financial Crisis," Figure 9

[157] If Dr Finnerty knows of an approach to VaR estimation such that the VaR estimated at the 5% probability level would have been materially affected by the possibility that such events rare events would occur, he does not say so in his report

same time, he provides no deposition testimony from risk managers involved in the production of VaR at Bear Stearns. He ignores how VaR was estimated at Bear Stearns, how it evolved, and what the industry practice was at the time, including the use of other risk management tools. Overall, Dr. Finnerty has not shown that he understands how the VaR model was estimated at Bear Stearns or how it was used. I find his criticisms of Bear Stearns's VaR models misplaced and unfounded.

94. Dr. Finnerty cites to a comment letter from the Securities and Exchange Commission ("SEC") dated December 2, 2005 (the "2005 SEC Letter") that "Bear Stearns failed to update its VaR models and lacked any established 'controls and written procedures related to the update of VaR data inputs and a periodic model review process.... As a result, the firm's daily VaR amounts could be based on stale data at any point of time.'"[158] While the SEC made this comment in 2005, Dr. Finnerty provides no evidence that he has reviewed Bear Stearns's VaR models during the Relevant Period or performed any analysis that shows Bear Stearns's VaR models continued to use stale data, the purported extent to which data was stale, or whether the use of such purportedly stale data would have materially affected Bear Stearns's VaR estimates and the business decisions made based on the VaR.

95. Furthermore, Dr. Finnerty ignores evidence that, according to SEC commentary made in 2008, specifically the Division of Trading and Markets Management commentary in response to a report issued by the SEC's Office of Inspector General ("OIG") dated September 25, 2008 (the "2008 OIG Report"), Bear Stearns did in fact make changes to its VaR infrastructure in response to the concerns raised by the SEC in 2005:

> The firm in fact made significant progress in improving its VaR infrastructure subsequent to approval in response to Commission staff concerns. For example, the firm followed through on recommendations to enhance control over the VaR system. Inputs to VaR models were regularly updated following application approval.
>
> Since the beginning of the SEC oversight of Bear as a CSE, Bear regularly improved and expanded its data sources. In some instances, where data sources were limited, the instruments were immaterial. For example, mortgage derivatives, which were distinct from CDS and

[158] Finnerty Report ¶ 141(f).

> ABS CDO positions, were an immaterial exposure with only de minimis impact on Bear's profit and loss.[159]

There is no published response from the OIG on this commentary from the SEC.[160]

96. Dr. Finnerty claims that despite repeated statements from Bear Stearns during the Relevant Period that "its risk management models were appropriate and regularly updated," internally Bear Stearns employees were concerned about the adequacy of their valuations models and their outdated risk management systems.[161] To support this claim, he cites to several email communications including a January 7, 2007 email between Rupert Cox and Michael Alix in which Mr. Cox states:

> Our positions in risky tranches contributed a fairly stable and in some ways surprisingly small amount of risk but I think that's due to the fact that VaR doesn't really capture the risk of these products which is fundamentally a tail risk.[162]

97. Dr. Finnerty fails to explain why this statement is a criticism of the VaR framework rather than a recognition that VaR does not measure the impact of risks that have a much lower probability of occurring than the probability level used to measure VaR. Hence, Mr. Cox was just stating the obvious fact that the risk arising from very low probability events is not captured by a VaR that corresponds to a loss that is exceeded 5% of the time or one trading day in twenty.

98. Similarly, Dr. Finnerty cites to the 2008 OIG Report and quotes the following as a criticism of Bear Stearns's VaR models in 2007 and 2008: "Bear Stearns's VaR models did not capture risks associated with credit spread widening of non-agency mortgages that are prime or near-prime (Alt-A)…"[163] Dr. Finnerty seems to ignore that the statement he quotes from the 2008 OIG Report is based on internal notes taken by SEC employees during the SEC's Consolidated Supervised Entity ("CSE") review of Bear Stearns's risk management function in October 2005.[164] Dr. Finnerty

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[159] "SEC's Oversight of Bear Stearns and Related Entities The Consolidated Supervised Entity Program," September 25, 2008, or "2008 OIG Report," p 94
[160] 2008 OIG Report, pp 116–117
[161] Finnerty Report ¶ 155, 2008 OIG Report
[162] Finnerty Report ¶ 155(a), BEAR 01280265
[163] Finnerty Report ¶ 160(e)
[164] According to the 2008 OIG Report, this statement is based on a "[Division of Trading and Markets] Internal memorandum Bear Stearns & Co Inc , Consolidated Supervised Entity Market Risk Review, October 2005,Appendix D Scenario Analysis Summary Report " *See* 2008 OIG Report, pp 24, 84

ignores that this statement did not appear in the subsequent December 2005 letter the SEC sent to Bear Stearns that describes the SEC's findings from the review.[165] Dr. Finnerty also ignores that according to the SEC commentary, the 2008 OIG Report relies "extensively, if not exclusively, on information in informal Division staff memoranda that recorded notes, not final conclusions…"[166] In addition, Dr. Finnerty offers no evidence that this issue still existed during the Relevant Period.

99. Importantly, such a criticism reflects a misunderstanding of how VaR was estimated at Bear Stearns. As explained above, Bear Stearns's VaR was estimated through a historical simulation. Dr. Finnerty fails to note that the criticism he cites was taken from notes made in 2005 when credit spread widening for prime or near-prime non-agency mortgages was not an event that had occurred frequently during the historical period used for VaR estimation.[167] Consequently, given how Bear Stearns was estimating VaR, whether or not this risk was included in its VaR model would have been largely irrelevant in 2005.

100. Dr. Finnerty quotes the 2005 SEC Letter, "[t]he firm does not maintain an overall firmwide Value-at-Risk ("VaR") limit."[168] Again, he did not investigate whether this criticism was applicable during the Relevant Period. He cites that Mr. Samuel Molinaro, the CFO, did not remember in his 2014 deposition whether Bear Stearns had an aggregate VaR limit.[169] Dr. Finnerty does not explain that (1) Bear Stearns responded to the SEC in January 2006 that it had established a firm-wide VaR limit,[170] (2) in the same response Bear Stearns stated that it did not believe that "the previous lack of this limit was indicative of any control weakness,"[171] and (3) that Bear Stearns's Daily VaR and Stress Testing Summary Reports during the Relevant Period actually compared the firm-wide VaR to the limit.[172]

101. Dr. Finnerty further claims that "Bear Stearns's VaR framework did not incorporate all applicable risks" and cites to the 2007 FSA Letter that recommends Bear Stearns

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[165] 2005 SEC Letter
[166] 2008 OIG Report, p 84
[167] *See* Sherlund, S , 2008, "The Jumbo-Conforming Spread A Semiparametric Approach," *Finance and Economics Discussion Series Working Paper,* p 22, "Rate Spread Between Traditional Conforming and Jumbo Mortgages Remains Stubbornly High," *HousingWire,* June 18, 2008, Boyarchenko, N et al , 2015, "Understanding Mortgage Spreads," *Federal Reserve Bank of New York Staff Reports* no 674, p 36
[168] Finnerty Report ¶ 141(b)
[169] Finnerty Report ¶ 158(b)
[170] Bear Stearns's Response to the SEC's 2005 Letter, January 17, 2006, p 6
[171] Bear Stearns's Response to the SEC's 2005 Letter, January 17, 2006, p 6
[172] *See, e g ,* BEAR 02005868–73 at 69

adopt a "risks not in VaR" framework to identify and quantify risks inherent in the company's business that are not captured or not captured sufficiently well by Bear Stearns's VaR model.[173] The purpose of the 2007 FSA letter was to provide Bear Stearns with feedback regarding the "CAD2" model application of two of its subsidiaries "for authorization to use [Bear Stearns's] internal VaR model for calculating [their] regulatory market risk capital."[174] Dr. Finnerty apparently misconstrues this recommendation from the FSA as evidence of a deficiency in Bear Stearns's VaR model.

102. Dr. Finnerty does not explain what "all applicable risks" mean. By construction, the VaR framework of a bank will not incorporate all risks. It cannot do so for multiple reasons. For instance, daily VaR is only useful if it is produced quickly—knowing today's VaR two days from now is useless. This severely limited the number of risk factors that could be taken into account in the VaR estimation in 2007. Second, as discussed above, VaR is not equipped to take into account extreme outcomes that have a low probability of occurring and thus have not manifested themselves in the historical data used to estimate VaR. Third, it was well-known in 2007 that VaR models did not incorporate liquidity risks because there was not a well-accepted robust way of doing so.[175]

103. Even the FSA letter indicated that VaR is just one tool for risk management, which is why it recommended a "risks not in VaR framework".[176] Furthermore, the FSA letter did not seem to regard the absence of certain risks in Bear Stearns's VaR model as a deficiency. If there were risks not incorporated in the VaR model, then the letter indicated that the FSA would compensate for this by ascribing appropriate "risk-based capital add-ons."[177]

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[173] Finnerty Report ¶ 144(c)
[174] BEAR 01652024–31 at 24
[175] *See* Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 71, Goldman Sachs Form 10-K for FY 2007, filed on January 29, 2008, p 88, Lehman Brothers Form 10-K for FY 2007, filed on January 29, 2008, p 70, Merrill Lynch Form 10-K for FY 2007, filed on February 25, 2008, p 62, Morgan Stanley Form 10-K for FY 2007, filed on January 28, 2008, p 87
[176] BEAR 01652024–31 at 27
[177] BEAR 01652024–31 at 27

> Such a framework will be a useful tool to evidence that your VaR model captures the material risks in your portfolio, and if it does not, will allow us to agree [on] appropriate risk-based capital add-ons.[178]

104. An often-used survey of the risk management practice in financial institutions is the bi-annual global survey conducted by Deloitte.[179] For the Relevant Period, the most recent survey was the 2004 survey, which examined the market risks across asset classes that firms included in their market risk VaR. That survey had 162 participants,[180] 20% of which were in the category of "Investment Bank & Other."[181] While more than 60% of all firms surveyed extensively covered fixed income assets through VaR, less than 50% did so for equity, slightly more than 20% did so for asset-backed securities, and less than 10% did so for energy.[182] While the survey does not separate out the responses for investment banks, it does show that the typical respondent, which is a large global financial institution, did not have a VaR that extensively covered market risks across all asset classes.

105. My understanding is that the VaR framework at Bear Stearns during the Relevant Period was designed to capture all risks that affected the daily P&L. However, as in any bank, the VaR at Bear Stearns was not designed to capture all risks. It was therefore important for Bear Stearns to use additional approaches to assess risk and it did so. A standard approach to supplement VaR and to provide information about the risk of rare events is to conduct scenario analysis and stress tests, which calculate portfolio values for specific values of certain risk factors.[183] Bear Stearns used such approaches and disclosed that it did so.[184] Bear Stearns's Daily VaR and Stress Testing Summary Reports show daily historical and hypothetical scenario stress tests.[185] In addition, Bear Stearns added an economy-wide recession scenario for US non-agency residential products in the fall of 2007.[186] By February 2008, Bear

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[178] BEAR 01652024–31 at 27
[179] "Global Risk Management Survey," Deloitte, 2004
[180] "Global Risk Management Survey," Deloitte, 2004, p 3
[181] "Global Risk Management Survey," Deloitte, 2004, p 2
[182] "Global Risk Management Survey," Deloitte, 2004, p 23
[183] Stulz, R, 2003, Risk Management and Derivatives Thomson South-Western, pp 416–417 *See also* Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 72 ("Stress testing (also referred to as scenario analysis) measures the risk of loss over a variety of extreme market conditions that are defined in advance ")
[184] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 70, Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 72
[185] *See e g* , BEAR 02005868–73 at 71
[186] Parameters of the scenario included two quarters of GDP contraction, a 2-3% increase in unemployment, 10% home price depreciation over the next year, yields falling by 100 bps in two year treasuries and 25 bps in ten year treasuries, 20% drop in equities over six months, and MBS/ABS spreads widening by 50%, among others *See* BEAR 01251529–39 at 30–31

Stearns considered additional parameters for use in its stress testing scenarios.[187] For example, it implemented a deep recession scenario that showed a loss of $480 million on February 22, 2008.[188] Bear Stearns also used measures of exposure to assess risk (for instance, the change in the value of a portfolio in response to an increase in the Treasury bill rate) and reported on these measures in its daily VaR report.[189]

106. Finally, Dr. Finnerty ignores that investment banks' VaR models continue to evolve as these institutions incorporate changes in markets as well as technological advances into their VaR. He has not shown that Bear Stearns's VaR approach was inconsistent with industry practice among its peers or that other investment banks somehow had approaches to VaR that could not be improved.

107. In sum, Dr. Finnerty's methods of evaluating Bear Stearns's VaR models are flawed and do not support his conclusions.

VII. A reasonable investor would not expect that risk management practices at a financial institution cannot be improved, but Dr. Finnerty does not distinguish between criticisms that are par for the course in external evaluations of risk management, suggestions that are made because a risk management function tries to improve its practices, and criticisms that would indicate serious systemic problems.

108. According to a presentation to Standard & Poor's, Global Risk Management at Bear Stearns had 189 employees.[190] This was a complex organization that had to monitor risk at Bear Stearns in real time and produce a wealth of reports daily. It would be surprising if an outsider assessing an organization like that could not find ways to improve its practices and did not find instances where policies were not perfectly followed. The important issue in the current matter is whether there were alleged flaws that were material enough to have led to the collapse of Bear Stearns or made the disclosures from Bear Stearns inaccurate or misleading. Dr. Finnerty does not distinguish analytically among the various criticisms that he alleges were made of Bear Stearns's risk management practices nor has he established that these various criticisms reflected material deficiencies in Bear Stearns's risk management function.

[187] As of February 22, 2008, Bear Stearns's scenario analyses had four specifications. In order of severity, they were: benign, mild recession, severe recession, and deep recession. *See* BEAR 00327275–306 at 305.
[188] BEAR 00327275–306 at 305.
[189] *See, e.g.*, BEAR 02005868–73 at 69.
[190] BEAR 01250204–79 at 14.

While he adds emphasis to certain phrases and statements that he quotes from the various documents that he cites in his report, he does not explain why he adds such emphasis. Many of these alleged criticisms amount to observations that various practices were not fully documented. Dr. Finnerty does not explain how the failure to produce complete documentation would eventually lead to the failure of Bear Stearns.

109. Dr. Finnerty also fails to account for the fact that risk management practices evolve over time. As I have explained in my teaching and research, the field of risk management evolves because risks change, markets and regulations change, firms change, new techniques are developed, computers become more powerful and efficient, new data becomes available, and financial innovations take place.[191] New approaches to risk management are developed as new types of risks come into focus. Models used in risk management also change because statistical techniques improve and data becomes available.[192] Firms acquire new activities and develop new products that have to be integrated into their risk management systems. Finally, in large firms, Information Technology ("IT") systems play a large role in how various risk management systems operate. As IT systems evolve, risk management practices change because new approaches become feasible. Computing power was dramatically higher in 2007 than when VaR was introduced, but it is dramatically higher today than in 2007.

110. As part of this process of change in a firm's risk management practices, it is normal for the various aspects of risk management in a firm to be criticized, both internally within the firm and externally by third parties such as independent auditors and regulators. Such criticisms are healthy and lead to changes and improvements in risk management practices or awareness of their limitations. Good risk management functions seek ways to improve and look at themselves critically. Dr. Finnerty ignores this important feature of risk management.

111. Furthermore, Dr. Finnerty fails to specify what he thinks Bear Stearns's risk management practices should have been. He cites to various issues raised concerning Bear Stearns's risk management function which are part of routine evaluations of risk

[191] Stulz, R., 2003, *Risk Management and Derivatives*, Thomson South-Western, pp. 606, 638. For example, Bear Stearns disclosed that "[w]hile the Company recognizes that no methodology can perfectly predict future market conditions, it believes that [its stress-testing] tools are an important supplement to the Company's risk management process. The Company expects to continue to develop and refine its formal stress testing methodologies." *See* Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p. 70, Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p. 72.

[192] Stulz, R., 2003, *Risk Management and Derivatives*, Thomson South-Western, p. 606.

management, yet he has not established, for example, the extent to which Bear Stearns's risk management practices and policies differed from those at other investment banks, and whether these differences in any way contributed to Bear Stearns's collapse or made Bear Stearns's disclosures materially inaccurate or misleading. I have yet to hear of a risk management function at a bank that has achieved perfection, but Dr. Finnerty has done no analysis to assess whether potential flaws at Bear Stearns's risk management function were serious enough to have led to the firm's collapse or to have made its disclosures incorrect or misleading.

112. In the remainder of this section, I examine a number of the alleged deficiencies of risk management that Dr. Finnerty enumerates in his report. Dr. Finnerty lists many alleged deficiencies without any attempt to assess their importance or any investigation of his own to verify that these deficiencies actually existed throughout the Relevant Period. Documents I have reviewed suggest that certain alleged deficiencies were not in effect during the Relevant Period, or that Dr. Finnerty derives misleading implications from various alleged deficiencies by ignoring or misunderstanding their context. Since the previous section discussed in detail alleged deficiencies of Bear Stearns's VaR model, in this section, I consider other alleged deficiencies of Bear Stearns's risk management practices.

113. While I do not comment on every single criticism Dr. Finnerty made of Bear Stearns's risk management in this section, I show that his approach is fundamentally flawed as: (1) he fails to establish that the alleged deficiencies applied during the Relevant Period, (2) he ignores clear evidence that many of the alleged deficiencies were not in effect during the Relevant Period, (3) he fails to demonstrate that the alleged deficiencies played a role in the collapse of Bear Stearns, and (4) he fails to demonstrate how the alleged deficiencies made Bear Stearns's disclosures materially inaccurate or misleading. Although I do not investigate each alleged deficiency, given the fundamental flaws in Dr. Finnerty's approach, if I do not specifically discuss an alleged deficiency, it would be incorrect to conclude that I agree with Dr. Finnerty that this alleged deficiency existed or played a material role in the collapse of Bear Stearns or that it made Bear Stearns's disclosures inaccurate or misleading.

A. Dr. Finnerty ignores evidence that a number of concerns about Bear Stearns's risk management raised in the 2005 SEC Letter and the 2008 OIG Report did not apply during the Relevant Period.

114. To claim that there were alleged deficiencies and gaps in Bear Stearns's risk management practices, Dr. Finnerty quotes extensively from several documents, including the December 2005 SEC Letter and the September 2008 OIG Report, without conducting any independent analysis to ascertain whether the quotes he cites as evidence have any basis during the Relevant Period.[193] Dr. Finnerty states that the 2005 SEC letter lists numerous concerns that the SEC had identified during its examination conducted in connection with Bear Stearns's application to be regulated as a CSE, and that the 2008 OIG Report (which also referenced the 2005 SEC Letter) identified problems with Bear Stearns's risk management, "confirming that Bear Stearns did not have adequate valuation models and procedures."[194]

115. As I already discussed, Dr. Finnerty has not analyzed and I have seen no evidence in the materials he submitted that demonstrates that the issues raised in the 2005 SEC letter and the 2008 OIG report affected risk management during the Relevant Period, or that Bear Stearns would not have collapsed in March 2008 had those alleged risk management deficiencies not existed. For example, Dr. Finnerty cites from the 2005 SEC Letter that "Bear Stearns should enhance its pricing model validation policies to provide more specificity (i.e., written procedures)."[195] My understanding of the SEC criticism is that the written documentation explaining the policies of the model review function at Bear Stearns were not detailed enough. Dr. Finnerty has provided no evidence that the lack of such written policies or procedures led Bear Stearns, for example, to misjudge risk or that Bear Stearns would have taken less risk had it had more written procedures.[196] He has not even examined whether Bear Stearns's models were deficient as a result of the alleged lack of specificity in the written policies.

116. Dr. Finnerty does not discuss at all the motivation of the 2005 SEC Letter and fails to take into account its context. In 2004, realizing the need for group-wide risk

[193] Finnerty Report, ¶¶ 140–143, 160–161.
[194] Finnerty Report, ¶ 160.
[195] Finnerty Report, ¶ 141(g).
[196] Dr. Finnerty also ignores that risk management has become much more formalized than it used to be, as I discuss in Section VII.B.

monitoring, and to fill the regulatory gap created by the European Commission Directive, the SEC implemented the voluntary CSE program in 2004.[197] Participants were restricted to large broker-dealers already supervised by the SEC.[198] The program had stringent requirements as explained by the SEC:

> The CSE program has five principal components: First, CSE holding companies are required to maintain and document a system of internal controls that must be approved by the Commission at the time of initial application. Second, before approval and on an ongoing basis, the Commission examines the implementation of these controls. Third, CSEs are also monitored continuously for financial and operational weakness that might place regulated entities within the group or the broader financial system at risk. Fourth, CSEs are required to compute a capital adequacy measure at the holding company that is consistent with the Basel Standard. Finally, CSEs are required to maintain significant pools of liquidity at the holding company, where these are available for use in any regulated or unregulated entity within the group without regulatory restriction.[199]

Participants in the CSE program were required to adhere to a rigorous regime, and the 2005 SEC Letter was part of an examination designed to make sure that Bear Stearns's models were compliant with the CSE program.[200] Bear Stearns's inclusion and continued participation in this program is a reflection of Bear Stearns's commitment to have risk controls meeting a high standard and be transparent to regulators.

117. Dr. Finnerty's extensive reliance on these documents, in particular the 2008 OIG Report, is puzzling given the fact that the OIG acknowledged in the "Scope and Methodology" appendix of the report that the OIG did not "perform an independent assessment of the firm's risk management systems (e.g. internal controls, models etc.)."[201] Moreover, according to the SEC Commentary in response to the OIG ("SEC Commentary"), which is included in the OIG Report as Appendix VII, the

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[197] "Testimony of Robert Colby, Deputy Director of U S Securities & Exchange Commission, Before the U S House of Representatives Financial Services Committee," April 25, 2007 ("Motivated in part by the need for group-wide risk monitoring, and in part by requirements of the European Union's Financial Conglomerates Directive, [ ] the Commission in 2004 crafted a new comprehensive consolidated supervision regime [ ] ")

[198] "Testimony of Robert Colby, Deputy Director of U S Securities & Exchange Commission, Before the U S House of Representatives Financial Services Committee," April 25, 2007

[199] "Testimony of Robert Colby, Deputy Director of U S Securities & Exchange Commission, Before the U S House of Representatives Financial Services Committee," April 25, 2007

[200] 2005 SEC Letter, p 1

[201] 2008 OIG Report, p 71

SEC Staff believes that the 2008 OIG Report contains numerous factual and analytical errors, relies on informal staff memos that are not final conclusions, and cites staff notes out of context.[202] For example, the SEC Commentary stated:

> It is our view that the resulting OIG Report starts from incorrect assumptions and reaches inaccurate, unrealistic, and impracticable conclusions. … Given continuing market events, we feel it is not possible to responsibly make the type of statements that were made in this OIG Report about the demise of Bear Stearns … the events subsequent to the failure of Bear Stearns strongly suggest that the statements made in this OIG report are premature at best. For our part, we believe that the key conclusions of the OIG Report are inaccurate and without empirical foundation.[203]

118. As I will discuss in more detail below, Dr. Finnerty appears to ignore this SEC Commentary altogether. Specifically, he ignores that according to the SEC Commentary, Bear Stearns had taken specific actions and measures to address the risk management concerns identified in both the 2005 SEC Report and the 2008 OIG Report.[204] He also ignores that as Bear Stearns's risk management evolved, issues raised in the 2005 SEC letter would naturally be resolved in the process of fine-tuning and extending the implementation of various models and procedures. Moreover, Dr. Finnerty fails to account for the fact that Bear Stearns's CSE application was approved,[205] and that its continuation in the program indicates that the SEC was satisfied with Bear Stearns's internal risk controls.

119. In Section II where I list the summary of allegations in this matter related to risk management issues, I quote a summary of Dr. Finnerty's findings on risk management. His first claim, based on the 2005 SEC letter and the OIG report rather than an investigation of his own, is that Bear Stearns "knew since at least 2005 that its mortgage derivatives models and its VaR models needed to undergo a thorough review and be updated" and "Bear Stearns nonetheless failed to complete a review of its mortgage derivative models before it collapsed in March 2008."[206] However, he

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[202] SEC Commentary, p 84 ("Large portions of the OIG's Report rely extensively, if not exclusively, on information contained in informal Division staff memoranda that recorded notes, not final conclusions The OIG Report cites staff notes out of context")
[203] SEC Commentary, pp 83–85
[204] SEC Commentary, pp 83–115 Note that there is no published response from the OIG specific to the SEC commentaries that I discuss in this section
[205] 2008 OIG Report, p 1
[206] Finnerty Report, ¶ 161

fails to note that Bear Stearns's Internal Audit performed "a general controls review of the firm-wide value-at-risk ('VaR') calculation engines" that was completed in January 2007.[207] Further, an Internal Audit report dated January 5, 2007 suggests that "all derivative pricing models currently being used have been subject to model review."[208] Hence, the first opinion that Dr. Finnerty states appears to be contradicted by audit reports from the beginning of the Relevant Period and he has failed to show that this criticism was in effect during the Relevant Period. While the comments of the SEC might have led Bear Stearns to perform these reviews, it is possible that such reviews would have been performed as part of the normal review of risk management.

120. Dr. Finnerty also ignores evidence in the SEC Commentary that contradicts his criticisms. He quotes the 2008 OIG Report that there were concerns regarding Bear Stearns's staffing of its model review function and that "[a]s a result, mortgage modeling by risk managers floundered for many months…the reviews of mortgage models that should have taken place before the subprime crisis erupted in February 2007 appears to have never occurred, [and] was still a work in progress when Bear Stearns collapsed in March 2008."[209] However, Dr. Finnerty ignores that according to the SEC Commentary, Bear Stearns had completed reviews of its mortgage-backed securities and cash inventory models and hired new staff or shifted model review responsibilities in response to certain employee departures. More specifically, the SEC made the following statements:

> While the OIG Report correctly notes that the staff raised concerns with Bear Stearns regarding its coverage and staffing of its Model Review Function, the OIG Report does not reflect the resulting subsequent progress. **In fact, the firm did respond to staff concerns, and created and implemented action plans to address them.** For example, in September 2006 Bear hired two dedicated model control staff persons for MBS and cash products and three completed model reviews were presented at this time. **The MBS and Cash inventory models were reviewed between September 2006 and December 2007**….

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[207] BEAR 01204438–42 at 38

[208] BEAR 02034870–75 at 72 Because Dr Finnerty does not provide a definition of "mortgage derivatives models" in his allegation, I cannot verify whether the discussion of "all derivative pricing models" discussed in the January 5, 2007 Internal Audit report fully rebut his allegation However, derivatives pricing models generally include mortgage derivatives models

[209] Finnerty Report, ¶¶ 160(c), 160(d)

> The OIG report assumptions and conclusions regarding Bear's model review staffing are inaccurate. Specifically, while certain model reviewers left Bear in 2006 and the head of model validation resigned in early 2007, TM [SEC Division of Trading and Markets] staff discussed staffing and the model validation process with the head of Bear's Model Review Committee. The model control function for mortgages was shifted to the product line risk managers while a new Head of Model Validation was hired in Sept 2007. Model control work on mortgages was unaffected during the interim period. [210]

Thus, Dr. Finnerty has not shown that these criticisms that he quotes from the 2008 OIG Report were even valid during the Relevant Period. Moreover, my review of documents in the record also shows evidence separate from the SEC Commentary suggesting that "MBS and Cash" models were being reviewed before the start of the Relevant Period.[211]

121. Dr. Finnerty also ignores Bear Stearns's responses to the 2005 SEC Letter. Dr. Finnerty cites the 2005 SEC Letter stating that Bear Stearns allowed "[c]ertain business heads [to] establish new trading limits and approve existing limit breaches with their sole written approval without direct approval from risk management."[212] He fails to note that in January 2006 Bear Stearns responded to the SEC as follows:

> Risk Management has been a signatory to new limit approvals but will modify policy such that new limits are not official until signed off upon by Risk Management. In addition, we will require that any long term limit violation approvals also be signed off upon officially by Risk Management.[213]

In other words, Dr. Finnerty ignores that by January 2006, which is prior to the start of the Relevant Period, Bear Stearns appears to have addressed this criticism raised by the 2005 SEC letter. Dr. Finnerty cites no evidence that this alleged deficiency in Bear Stearns's risk management persisted or affected Bear Stearns's risk management during the Relevant Period in such a way that Bear Stearns took risks that it would not have taken in the absence of the alleged deficiency.

122. In another instance, Dr. Finnerty quotes the 2008 OIG Report that Bear Stearns had

[210] SEC Commentary, pp. 93–94 (emphasis added).
[211] BEAR 01999462–85 at 68.
[212] Finnerty Report, ¶141(c).
[213] BEAR 01409520–58 at 25.

"serious mark disputes" with other major broker-dealers that were "becoming more common by the summer of 2007," and that "[t]he existence of such large mark disputes could lead to other brokers to question the validity of Bear Stearns's valuation models and reduce their willingness to do business with Bear Stearns."[214] He seems to assume that such mark disputes meant that Bear Stearns was necessarily wrong in its marks but he has not provided any evidence to show that this was indeed the case. In fact, he ignores that mark disputes were widespread during the crisis as explained in the SEC Commentary in response to the 2008 OIG Report:

> [M]argin disputes are unavoidable particularly when markets become less liquid or illiquid. This is an issue that all dealers are facing today and the total disputed numbers at Bear Stearns were much smaller than at other institutions. [215]

123. Further, there is ample evidence that during the crisis, dislocated markets made it more difficult to assess fair values for many types of financial instruments. Bear Stearns had a Mark-to-Market ("MTM") Committee that focused on mark issues. According to the MTM Committee Meeting Minutes I reviewed, Bear Stearns gave thoughtful consideration to their marking process.[216] For example, the committee had various discussions on collateral disputes regarding how much collateral should flow from Bear Stearns to a counterparty or vice versa. In one such situation, Bear Stearns utilized third-party prices to support its position:

> Collateral Disputes – In PAUGs there is currently a $10mm exposure versus the $80mm that Deutsche bank is stating. However we have vendor marks to collaborate [sic] our marks.[217]

Moreover, mark disputes with counterparties went both ways. There were times when Bear posted additional collateral to satisfy counterparties and vice-versa. As minutes from an MTM meeting documented:

> Lehman's collateral dispute now stands at $19-20mm. **They have asked us to post collateral on one trade but have yet to post**

[214] Finnerty Report, ¶ 160(g)
[215] SEC Commentary, p 96
[216] *See e g* BEAR 01220751, BEAR 01220386–87 at 86
[217] BEAR 01210023–24 at 24 PAUG stands for Pay As You Go which is a template for credit default swaps on securitizations

> **collateral on a trade where they owe us.** Risk believes this to be a reconciliation issues [sic].[218]

124. To make his unfounded assertion that Bear Stearns was somehow mis-marking its books during the Relevant Period, Dr. Finnerty also takes an email quote fully out of context. Specifically, Dr. Finnerty cites to an email dated November 7, 2007 from Peter Bainlardi to Michael Nierenberg and Tom Marano as shown below:

> They [risk management] feel they are being conservative and that there always seems to be a "bias" from our marks in that they are always aggressive to market as per totem – the implication is **that the desk is being dishonest and systematically mis-marking the book.** This is just not the case…[219]

125. However, Dr. Finnerty chooses to leave out the statement "[t]his is just not the case…" from the email such that the remaining quote that he cites appears to call into question the marking practice at Bear Stearns's trading desk.[220] In ignoring the proper context of this email, Dr. Finnerty fails to recognize that the statement that he focuses on indicates that there was a robust debate between risk management and the trading desks, which is a characteristic that one would expect from an independent and well-functioning risk management function.

126. Indeed, my review of MTM Committee Meeting Minutes also suggests that Bear went to great lengths to verify its marks, even prior to the crisis. For example, in mid-2006, Bear Stearns participated in several credit default swap "bench-marking" or price verification exercises with Mark-It for approximately 600 prices. In these bench-marking exercises, Bear Stearns's price submissions matched the consensus 85%–95% of the time.[221] The MTM Committee Meeting Minutes dated November 15, 2007 also point to a marks dispute from October, 2007 and discuss how Bear Stearns's recent trade with a profit above its marks suggests that the associated assets were not over-valued.[222]

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[218] BEAR 01220386–87 at 86 (emphasis added)
[219] BEAR 01227508-10 at 08 (emphasis added)
[220] BEAR 01227508-10 at 08, *see* Finnerty Report ¶165(c)
[221] DT_WP_000296443–57 at 48, DT_WP_000296458–72 at 63 Typically, pricing models perform well over some range of characteristics of the derivatives priced and hence, it is not surprising that Bear Stearns or any other bank would have found some differences between its models and other models
[222] BEAR 01220751 ("Calyon made a $32mm call at October month end but we are fairly confident in our marks as we recently did some trades where we generated positive P&L ")

127. Dr. Finnerty cites the 2008 OIG Report that "fundamental mortgage credit risk factors" including housing price appreciation "do not seem to have been incorporated into Bear Stearns's models at the time Bear Stearns became a CSE."[223] However, Dr. Finnerty ignores that the SEC Commentary in response to the 2008 OIG Report stated that Bear Stearns was using scenario analysis that was consistent with industry practice and that this analysis incorporated a recessionary scenario stemming from the housing sector:

> Bear Stearns' use of scenario analysis was consistent with industry practices: virtually the entire banking sector failed to anticipate the magnitude and scope of the housing decline that is still ongoing.[224]
>
> Contrary to the OIG Report statements, Bear did incorporate into its risk scenarios those risks discussed in meetings with TM staff, such as a housing-led recession scenario.[225]

128. Another example where Dr. Finnerty ignores evidence from the SEC Commentary that seems to make his alleged criticism irrelevant is when he cites the 2008 OIG Report that "Bear Stearns' risk managers had difficulty relating desk-specific VaR calculations to firm-wide VaR calculations."[226] It is not clear what is meant by this comment and Dr. Finnerty does not explain what he interprets this comment to mean. It would be disingenuous to immediately conclude from this comment that Bear Stearns's firm-wide VaR was inconsistent with the desk-specific VaRs. It is well-known, and in fact even explained in Bear Stearns's SEC filings,[227] that firm-wide VaR is not the sum of the desk-specific VaRs and that a number of important assumptions have to be made to obtain a firm-wide VaR from desk-specific VaRs.[228] I understand from my interview of Mr. Alix that at times desks had access to legacy VaR models that did not directly feed into the firm-wide VaR model and that comparisons between the legacy models and the firm-wide model led to questions

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[223] Finnerty Report ¶ 160(e)
[224] 2008 OIG Report, p 27
[225] SEC Commentary, p 95
[226] Finnerty Report ¶ 160(f)
[227] Bear Stearns Form 10-K for FY 2006, filed on February 13, 2007, p 69, Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 71
[228] The reason VaRs cannot generally be added up is straightforward The VaR of two portfolios will benefit from the fact that in general when one adds a portfolio to another, the resulting portfolio is better diversified and hence its return will be less risky

from the desks. Moreover, according to the SEC Commentary in response to the 2008 OIG Report, Bear Stearns did not use inconsistent VaR numbers:

> Contrary to the OIG Report assertion, Bear did not use inconsistent VaR numbers; The OIG expert supports this conclusion by noting that Bear's trading desks evaluated profits and risks individually and so assumes VaR was not implemented firm[-]wide. Bear's trading desks and businesses used a variety of metrics to measure and manage its risk. VAR, however, was implemented firm-wide.[229]

129. Dr. Finnerty cites the 2008 OIG Report that "[a]t Bear Stearns, traders used hedge ratios that were consistent with the traders' own models even though the risk managers' VaR models indicated that different hedge ratios would be more appropriate..."[230] Such a comment seems to reflect a lack of understanding of normal industry practices and potentially contradicts Dr. Finnerty's other comments. If the risk managers' VaR was indeed deficient as Dr. Finnerty claims, then it is likely that using hedge ratios based on the traders' own models would be more appropriate. In any case, I understand that traders generally have the discretion to put on the hedges that they see fit as long as the risk they take is within the limits that are assigned to them.

130. In sum, Dr. Finnerty's opinions ignore much information that is available to him[231] in the 2008 OIG Report that indicates that the alleged deficiencies he focuses on were disputed by the SEC or had been resolved by Bear Stearns either in response to the SEC or as part of its own work in improving its models and practices. Importantly, even if the criticisms he reports were correct, he has not shown that Bear Stearns would have behaved differently without these alleged risk management deficiencies and would not have collapsed. Further, he has not shown that a reasonable investor would have inferred from these criticisms that Bear Stearns's disclosures of its risk management practices were erroneous or misleading.

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[229] SEC Commentary, p 96
[230] Finnerty Report ¶ 160(b)
[231] The Wayback Machine of the Internet Archive indicates that the 2008 OIG Report that includes the SEC Commentary, i e , Appendix VII, has been publicly available at the latest since February 2009 until now *See* http //web archive org/web/20090101000000*/http //www sec gov/about/oig/audit/2008/446-a pdf

B. Dr. Finnerty fails to consider the nature of Oliver Wyman's engagement with Bear Stearns and misrepresents the content of the Oliver Wyman presentations.

131. Dr. Finnerty relies on a series of presentations[232] delivered by Mercer Oliver Wyman ("Wyman") between July 2007 and March 2008 to claim that there was a "fundamental weakness" in Bear Stearns's risk management practices.[233] As in other parts of his report, he relies solely on a carefully crafted set of excerpts and quotes without conducting an independent analysis of his own. However, he either completely ignores or fails to investigate the context of these presentations and misrepresents the excerpts and quotes that he relies on to draw conclusions. As such, his criticisms are unsupported and unfounded.

132. Dr. Finnerty fails to consider that in early 2007, Wyman was hired to assist Bear Stearns in developing an "economic capital" framework as well as to enable the firm's UK ("BSIL") and Irish ("BSB") legal entities to complete the Internal Capital Adequacy Assessment Process ("ICAAP") for submission to their respective national regulators by June 30, 2007.[234] Subsequently, Wyman was also retained in the fall of 2007 to help Bear Stearns consider "what other process improvements or organizational changes may be necessary to meet future market challenges and business demands."[235] As I understand from Mr. Alix, this new assignment was motivated by the fact that the "recent market turmoil" had essentially provided a stress test of risk management and Bear Stearns wanted to make sure that it would draw appropriate lessons from its experience.[236] In addition, I understand that Bear Stearns wanted to make sure that the departure of Warren Spector did not lead to gaps in its risk management. Failing to consider this important context in which the Wyman presentations were delivered, Dr. Finnerty claims that some discussions in the Wyman presentations were evidence that there was "a fundamental weakness" in Bear Stearns's risk management.

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[232] While Dr. Finnerty refers to these as "reports", they appear to be presentation slides based on my review. Finnerty Report, ¶ 149, BEAR 02002528–59, BEAR 02002450–64, BEAR 02002528–59, BEAR 00133913–29, BEAR 02001498–517

[233] Finnerty Report ¶¶ 149–154

[234] Bear Stearns's legal entities BSIL and BSB were in compliance with their respective regulatory capital requirements as of November 30, 2007. BEAR 01249287, Bear Stearns Form 10-K for FY 2007, filed on January 29, 2008, p 58

[235] BEAR 01170036

[236] BEAR 01170036

1. Dr. Finnerty fails to consider that in early 2007 Wyman was initially engaged to assist in the potential development of Bear Stearns's economic capital framework.

133. Economic capital is the capital that a firm has to have to support its risk-taking activities given its risk appetite.[237] When a financial institution maintains a larger capital buffer, it is less likely to fail given the risks it takes. Financial institutions view capital to be expensive, so they face a risk-return tradeoff in choosing their capital position. An economic capital framework provides an approach for a financial institution to choose its capital buffer using the tools of risk management. Generally, this approach sets the optimal economic capital level using a firm-wide VaR or using stress tests. Irrespective of the approach chosen, the idea is that the capital buffer should enable the firm to have the capacity to absorb a wide range of losses. A benefit of the economic capital approach is that it can be used at all levels throughout a firm to allocate capital.[238]

134. While an economic capital framework uses the tools of risk management, it does not use them the same way that these tools are used, for instance, in quantifying and monitoring market risks. For example, Bear Stearns, like the other investment banks, used a *one-day* VaR for market risk. With an economic capital framework, a *one-year* VaR is used as the concern is typically about risks over a one-year period.[239] A one-year VaR is not useful for managing market risk when market conditions and positions change daily or even more frequently. Instead, a one-year VaR is useful for allocating capital within the firm and for setting its target leverage, as a one-year VaR corresponds to the budgeting cycle of most firms. Similarly, if an economic capital framework uses stress tests, it is typically about stressed outcomes that are likely to occur within a year. Again, assessing the impact of stress for a whole year is not an approach that is used for monitoring market risk on a daily basis. Hence, the risk management requirements for an economic capital framework had no direct implications for the risk management of market risk at Bear Stearns. An economic

[237] Economic capital is the "dollar level of capital necessary to adequately support specific risks assumed." See "Economic Capital and the Assessment of Capital Adequacy" Federal Deposit Insurance Corporation, https://www.fdic.gov/regulations/examinations/supervisory/insights/siwin04/economic_capital.html

[238] Stulz, R. and B. Nocco, 2006, "Enterprise Risk Management: Theory and Practice," *Journal of Applied Corporate Finance*, Vol. 18 No. 4, pp. 10, 19

[239] The FSA 2010 Individual Capital Adequacy Standards and Guidance ("ICAS 2010") provides an economic capital framework endorsed by regulators. While other time horizons can be chosen, the one year time period is typical. ICAS 2010, pp. 7, 32

capital framework is not designed to monitor market risk, but rather to ensure that it has sufficient capital to withstand shocks and remain solvent over a one year period with an extremely high probability.[240]

135. The first alleged flaw that Dr. Finnerty raises from the Wyman presentations makes clear that he ignores the purpose of this presentation and fails to consider what an economic capital framework is. He cites to a July 17, 2007 Wyman Presentation titled "Economic Capital Project: Market and Credit Risk Working Session."[241] This Wyman Presentation is focused on goals that an economic capital framework at Bear Stearns should strive for and not on market risk measurement issues.[242] Hence, the recommendations in that report were directed at the extent to which existing risk management tools and approaches can be used for an economic capital framework that did not yet exist at Bear Stearns at that time. Ignoring this critical fact, Dr. Finnerty claims that "[the Wyman] report criticized … Bear Stearns' VaR framework because it 'does not include movements corresponding to an ECAP-level stress event for most risk factors.'"[243] Such a statement by Wyman is not a criticism of Bear Stearns's current VaR model in its application as a tool to measure one-day market risk, which is what Bear Stearns's VaR model was used for. The statement by Wyman refers to the fact that a VaR model that focuses on losses that have a 5% probability of being exceeded for one day does not provide a measure of stress losses over a full year. Hence, to build an economic capital framework, Bear Stearns would have to develop tools to estimate stress losses over a full year.

136. Many financial institutions at the time did not have an economic capital framework. Among Bear Stearns's peer investment banks at the time, only two reported that they used some form of economic capital measurement.[244] A majority of financial institutions did not have such a framework. In the Deloitte survey I cited earlier, between 20% and 30% of the firms extensively used economic capital measurements at the enterprise level.[245] In that survey, a number of firms responded that they used

[240] ICAS 2010 specifies that "there should be a clear common definition of survival, ensuring that there is a 99 5% confidence level over a one year timeframe that the value of assets exceeds the value of liabilities " ICAS 2010, p 7
[241] Finnerty Report, n 155
[242] BEAR 02002528–59 at 32
[243] BEAR 02002528–59 at 36, Finnerty Report, ¶ 150(a)
[244] Merrill Lynch Form 10-K for FY 2006, filed on February 26, 2007, p 45, Morgan Stanley Form 10-K for FY 2006, filed on February 12, 2007, p 81
[245] "Global Risk Management Survey," Deloitte, 2004, p 16

these measurements "somewhat" or that they "planned to use" them.[246] These responses correspond to the state of development of economic capital frameworks at the time. A more recent survey, the 2012 survey, shows that at that time 65% of financial institutions surveyed calculated economic capital for market risk.[247]

137. Another survey of 22 leading US/European financial institutions, the ECAP Survey conducted by the International Financial Risk Institute ("IFRI"), also indicates that an economic capital framework was not prevalent at the time when Bear Stearns was considering it.[248] The ECAP Survey was taken three times in 2000, 2003, and 2006. The survey reports the "level of sophistication" of the financial institution's economic capital frameworks in five levels: "Comprehensive internal program (+external reporting)," "Mature internal program," "Program piloted," "Program in development," and "No overall program planned."[249] In 2000 when the first ECAP survey was taken, 21% of the financial institutions belonged in the "Comprehensive internal program (+external reporting)" level of sophistication.[250] In 2006, six years after the first survey in 2000, still only 35% of the financial institutions report that their economic capital framework is at the "Comprehensive internal program (+external reporting)" level of sophistication.[251]

138. The July 17, 2007 Wyman presentation provides a high-level outline of how Bear Stearns could build an economic capital framework based on its "existing well-developed risk infrastructure."[252] Dr. Finnerty cites narrowly from a slide where Wyman lists the necessary steps (under the heading "Areas for improvement") required to implement the "economic capital" framework at Bear Stearns, but summarily omits the "Strengths" of Bear Stearns's existing risk management practices that Wyman also identified.[253] Dr. Finnerty ignores the comment from Oliver Wyman that Bear Stearns had a "well-developed risk infrastructure," a comment that appears to contradict what Dr. Finnerty implies through much of his report.

139. For example, the same Wyman presentation slide identifies the following strengths of

[246] "Global Risk Management Survey," Deloitte, 2004, p 16
[247] "Global risk management survey, eighth edition Setting a higher bar," Deloitte, 2012, p 21
[248] BEAR00133913-29 at 26 and BEAR02001498–517 at 514
[249] BEAR00133913-29 at 26 and BEAR02001498–517 at 514
[250] BEAR00133913-29 at 26 and BEAR02001498–517 at 514
[251] BEAR00133913–29 at 26, BEAR02001498–517 at 514
[252] BEAR 02002528–59 at 32
[253] BEAR 02002528–59 at 36, Finnerty Report, ¶ 150

Bear Stearns's existing risk management framework:

> The VaR framework considers "[m]arket history across thousands of risk factors" and the "[s]ensitivities to risk factor movements."[254]
>
> The stress testing framework utilizes "[d]ata-based characterization of stress market moves over 20 years."[255]
>
> The credit rating models and scorecards are a "[c]onsistent system of internal rating and mapping to PD."[256]
>
> The credit exposure models include a "[b]aseline framework for simulating market risk factors" as was best practice at the time and account for "[e]xposure evolution modelling in relation to risk factors."[257]
>
> The jump to default model is a "[s]tandard framework for modelling default risk within a credit portfolio."[258]

140. Dr. Finnerty has not shown that the lack of an economic capital framework played any role in the collapse of Bear Stearns. Nor has he provided evidence that the adoption of an economic capital framework would have prevented the collapse of Bear Stearns. It is worthwhile to note that despite having an extremely elaborate economic capital framework, American International Group ("AIG") required a large bailout from the U.S. government to survive.[259] One shortcoming of economic capital frameworks at the time, whether they were designed with the help of Oliver Wyman or not, is that they do not appear to have been designed to enable firms to survive a crisis of the magnitude that occurred in 2007 and 2008.

141. Indeed, another Wyman presentation dated August 2, 2007, which Dr. Finnerty does *not* cite, supports this view. This presentation provides a "back-of-the-envelope" economic capital calculation for Bear Stearns and indicates that Bear Stearns ought to have capital of $11.1 billion, which was $2.2 billion less than Bear Stearns's stockholder equity at this time.[260] In other words, Bear Stearns already had sufficient

[254] BEAR 02002528–59 at 36
[255] BEAR 02002528–59 at 36
[256] BEAR 02002528–59 at 36
[257] BEAR 02002528–59 at 36
[258] BEAR 02002528–59 at 36
[259] American International Group Form 10-K for FY 2007, filed on February 28, 2008, pp 126–127
[260] BEAR00800986–1012 at 1000

capital according to the economic capital framework. This indicates that even if an economic capital framework was in place at Bear Stearns at the time, it would not have required that Bear Stearns raise additional capital. Hence, if this economic capital framework would have concluded that Bear Stearns had too much capital, it is not clear how it could have led to changes that somehow would have prevented the collapse of Bear Stearns.

2. Dr. Finnerty fails to consider that Wyman was subsequently engaged by Bear Stearns in late 2007 to assist in improving its risk management practices.

142. Dr. Finnerty fails to consider that Wyman was retained at Bear Stearns's initiative to improve its risk management practices in response to the market turmoil that financial institutions were experiencing in the second half of 2007 and to help it insure that the departure of Warren Spector did not lead to gaps in its risk management.[261] It is my opinion that seeking concrete ways to improve the risk management practices in the midst of uncertainty and turmoil in the financial markets is a sign of strength, rather than a sign of weakness. Risk-taking by its very nature involves uncertainty, and hence well-functioning risk management practices must seek ways to improve.

143. Consistent with the engagement of Oliver Wyman, in its October 2007 conference call with analysts, top Bear Stearns executives stated that the unprecedented 2007 crisis needed to be factored into models in the entire industry going forward, that all firms needed to "figure out how to retool," and that this retooling was part of a "continuous kind of improvement or continual monitoring processes."

> So there's no doubt that the risk management professions all have a new scenario now to paint into their models. It will be the 2007 crisis.... I think we will all figure out how to retool. I think we're all experiencing the same phenomenon.[262]

> It's just a constant evolution of risk management.... [T]he hallmark of this cycle for us was that the derivatives cash markets did not behave in the way that I think anybody's models would have anticipated... so you've got to just keep thinking through what other ways are there to

[261] BEAR 01170036, BEAR 02002450–64 at 53. This is also supported from my interview of Mr. Alix.
[262] "Bear Stearns Analyst Meeting," October 4, 2007, Transcript.

> hedge the positions we have. But it is not a change in process. It's just a continuous kind of improvement or continual monitoring process.[263]

144. Dr. Finnerty cites to a November 20, 2007 Wyman presentation titled "Risk Management Diagnostic: 1st Checkpoint."[264] I understand that this presentation was intended to be a list of *preliminary* issues Wyman identified to be relevant for improving the risk governance and risk information reporting at Bear Stearns, based on Wyman's ongoing fact-finding interviews with key risk personnel.[265] At the time this presentation was finalized, Wyman had not finished interviewing key risk personnel, so that it had an incomplete view of Bear Stearns's risk management.[266] As such, Wyman's recommendations in this November 20, 2007 report were not only preliminary but also incomplete. Indeed, many of the preliminary observations contained in this Wyman presentation disappear in the subsequent presentations where Wyman reported its formal recommendations to improve Bear Stearns's risk governance structure.[267] However, Dr. Finnerty chooses to cite such quotes in support of his alleged flaws of Bear Stearns's risk management.

145. For example, under the heading "Preliminary gaps: risk information and reporting", the Wyman presentation reports the following observations at Bear Stearns: [268]

> Firm-wide metrics such as VaR and stress tests [are] not viewed as accurate and timely; and
>
> [There is a l]ack of regular reporting that gives an integrated view across risk types.

146. These preliminary observations are not found in the subsequent Wyman presentations dated February 8, 2008, and March 7, 2008, which contained Wyman's formal and final recommendations on risk governance at Bear Stearns.[269] Ignoring that these are preliminary observations that do not appear in subsequent Wyman presentations, Dr.

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[263] "Bear Stearns Analyst Meeting," October 4, 2007, Transcript
[264] Finnerty Report, ¶ 151
[265] BEAR 02002450–64 at 53–54
[266] BEAR 02002450–64 at 64
[267] Not all "preliminary gaps" listed in the November 20, 2007 presentation led to recommendations in the formal risk governance diagnostic presentations dated February 8, 2008 and March 7, 2008 *See* BEAR00133913-29, BEAR 02001498-517
[268] BEAR02002450-64 at 60
[269] BEAR00133913-29 and BEAR 02001498-517

Finnerty fails to establish that these alleged "gaps" were in effect during the Relevant Period or "constitute[d] a fundamental weakness [at Bear Stearns]."

147. In its presentations, Wyman describes the top level organization of the risk governance at Bear Stearns. It points out that Bear Stearns does not have a "formal framework for risk appetite," there is "[n]o clear process for approval of major trades" and there is a "[l]ack of mandate for the Risk Policy Committee." It also remarks that there is a "[l]ack of coherent limit structure with consistent enforcement."[270] These comments are consistent with the view that Bear Stearns was not a very formal and hierarchical organization. Leading risk management practice at investment banks was to have a more formalized risk governance framework[271] and Wyman's recommendation to Bear Stearns was to introduce a more formalized risk governance framework.[272]

148. Again, however, Dr. Finnerty does not show that Bear Stearns would not have collapsed had it had a more formal risk governance framework. Perhaps more importantly, he does not show that the decisions that would have been made within a more formal risk governance framework would have been different from those that were made by Bear Stearns. In other words, he does not show that a more formal risk governance framework would have resulted in a different outcome for Bear Stearns. Since Wyman's first estimate of an economic capital model suggested that Bear Stearns had more than enough capital, it does not follow that a more formal risk governance framework for Bear Stearns would have resulted in a reduced risk appetite or less risk-taking. Moreover, Dr. Finnerty does not show that the issues raised by Wyman made Bear Stearns's disclosures incorrect or misleading.[273]

149. In sum, Dr. Finnerty fails to consider the nature of Wyman's engagement with Bear Stearns and misrepresents the context of the Wyman presentations. He fails to independently establish that these alleged gaps in Bear Stearns's risk management would have led Bear Stearns to behave differently had these alleged gaps not existed, nor has he demonstrated that these alleged gaps led to Bear Stearns's collapse.

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[270] BEAR00133913–29 at 17, BEAR 02001498–517 at 502
[271] BEAR00133913–29 at 18, BEAR 02001498–517 at 503
[272] BEAR00133913–29 at 19, BEAR 02001498–517 at 504
[273] It is worth noting that the Bear Stearns implemented Wyman's recommendation to charter a Risk Policy Committee and this was publicly disclosed by Mr Molinaro during a February 2008 meeting with analysts "Credit Suisse Group Financial Services Forum," February 8, 2008, Transcript, BEAR 00623983–4012 at 3997, BEAR 00133913–29 at 19, BEAR 02001498–517 at 504.

C. The two Bear Stearns Hedge Funds

150. Dr. Finnerty alleges that, contrary to Bear Stearns management's public disclosures, the risk management systems between Bear Stearns and the two Bear Stearns-sponsored Hedge Funds, i.e., the Bear Stearns High-Grade Structured Credit Fund and the Bear Stearns High-Grade Structured Credit Enhanced Leverage Fund, were not different.[274] Specifically, he alleges that the following statement made by Mr. Molinaro during a June 22, 2007 conference call was misleading:

> The asset management side and the broker-dealer side are very much separate. And of course, we have to have appropriate Chinese walls between the two parties and did so here. And these funds did operate independently of our mortgage department and our broker-dealer operations. Clearly, there are controls in place in the asset management side – did not – and obviously did not envision a market dislocation of this degree and this kind of a liquidity drain.[275]

151. As evidence of the alleged misrepresentation, he cites to a 2006 Alternative Investment Management Association Limited ("AIMA") due diligence document to conclude that "the two Bear Stearns Hedge Funds used Bear Stearns' trading and risk management systems (Bear Stearns' BondStudio analytical system), the Bear Stearns repo desk marked the two Bear Stearns Hedge Funds' investments to market, and Bear Stearns' and BSAM's risk management departments monitored the two Bear Stearns Hedge Funds' investment positions."[276]

152. Dr. Finnerty has not performed independent analysis to verify the accuracy of the information he cites from the 2006 AIMA document. Also, his conclusion contradicts the testimony of Ralph Cioffi, the manager of both funds since their inception through June 2007,[277] that there was independence between Bear Stearns and the two hedge funds:

[274] Finnerty Report, ¶¶ 27, 138(f)
[275] Finnerty Report, ¶ 138(f)
[276] Finnerty Report, ¶ 138(f),BEAR 01568638–73 at 54
[277] Deposition Testimony of Ralph Cioffi, October 15, 2014, pp 5–8

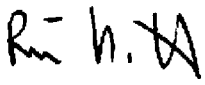
> Well, the only thing that would have been available to us from Bear would have been whatever models or systems that they allowed, you know, arm's length investors to use.[278]

153. In addition, I understand from my interview of Mr. Alix that, though the two funds had access to the BondStudio analytical system, this system was sold by Bear Stearns to hedge funds and other clients more generally. In other words, the two funds' use of the BondStudio analytical system was not the same as having access to Bear Stearns's risk management systems or having their risk managed by Bear Stearns's risk management function.

154. In sum, it is my opinion that Dr. Finnerty fails to demonstrate that the alleged deficiencies played a role in the collapse of Bear Stearns and fails to show how the alleged deficiencies made Bear Stearns's disclosures materially inaccurate or misleading.

[278] Deposition Testimony of Ralph Cioffi, October 15, 2014, p. 138.

Executed this 16th day of April, 2015



René M. Stulz

Appendix A

René M. Stulz

Fisher College of Business
806 Fisher Hall
2100 Neil Avenue
Columbus, OH 43210-1144
Phone: (614) 292-1970
Fax: (614) 292-2359
E-mail: Stulz@cob.ohio-state.edu
Homepage: www.cob.ohio-state.edu/fin/faculty/stulz/

Home Address:
3419 River Seine Street
Columbus, OH 43221
Phone: (614) 771-1110
Cell: (614) 206-0265

UNDERGRADUATE STUDIES

University of Neuchâtel, Switzerland, Licence es Sciences Économiques, 1975.

GRADUATE STUDIES

London School of Economics, 1975-1976, Visiting Graduate Student.

Massachusetts Institute of Technology (MIT), 1976-1980, Ph.D. in Economics.

ACADEMIC APPOINTMENTS

Ohio State University, Everett D. Reese Chair of Banking and Monetary Economics, 1996 to present.

University of Southern California, Visiting Professor, 2007.

University of Chicago, Visiting Professor, Stigler Center, 2003-2004.

Northwestern University, Visiting Scholar, Kellogg School of Management, 2003-2004.

Harvard University, Business School, August 1996 to July 1997, Bower Fellow.

Ohio State University, Director of the Dice Center for Research in Financial Economics, 1995 to present.

Ohio State University, Ralph Kurtz Chair in Finance, 1993-1996.

Ohio State University, Riklis Chair in Business and its Environments, 1988-1993.

Ohio State University, Professor of Finance, 1985 to present.

Appendix A

University of Chicago, Visiting Professor of Finance, 1986-1987.

Massachusetts Institute of Technology, Visiting Associate Professor of Finance, Fall 1985.

Ohio State University, Associate Professor of Finance, 1983-1985.

University of Rochester, Assistant Professor of Finance and Economics, 1980-1983.

OTHER RELEVANT POSITIONS HELD

Research Associate, National Bureau of Economic Research (Asset Pricing Group and Corporate Finance Group).

Director, NBER Project on the Risks of Financial Institutions.

Chairman, Scientific Council, Swiss Finance Institute, 2006 to present.

Board of Directors, American Finance Association, 1988 to 2000, 2002 to 2006.

Consultant to the World Bank, the IMF, the NYSE, Federal Reserve Bank of New York, corporations, and law firms.

Expert testimony in federal courts, state courts, and domestic and international arbitrations.

Taught executives in Europe, Asia and North America (open enrollment as well as for firms, courses on risk management, banking, derivatives, corporate valuation, investments).

Advisory Committee, Morningstar, 2000-2002.

Director, Banque Bonhôte, 2002 to present.

Director, Wegelin Fund Management, 1999 to 2010.

President, Gamma Foundation, 2002 to 2013.

Director, Community First Financial Group, Inc., 2001 to 2010.

Director, Peninsula Banking Group, Inc., 2001 to 2010.

Trustee, Global Association of Risk Professionals, 2002 to present; Executive Committee, 2004 to present; chair of governance committee, 2011 to present.

Chairman, Financial Risk Management Examination Certification Committee, Global Association of Risk Professionals, 2002 to present.

Appendix A

Chairman, New York Federal Reserve Bank/GARP Global Risk Forum (2011, 2013), Bank of England/GARP Global Risk Forum (2012, 2014), Hong Kong Monetary Authority/GARP Global Risk Forum (2013).

International Advisory Committee, NCCR, 2002 to 2011.

External Reviewer, London Business School Finance Department, 2005.

Financial Advisory Roundtable (FAR), Federal Reserve Bank of New York, 2006 to 2010.

Guest Contributor, Harvard Law School Corporate Governance Blog.

Squam Lake Group, member, 2008 to present.

Senior Academic Fellow, Asia Bureau of Finance and Economic Research, 2012 to present.

Fellow, Wharton Center for Financial Institutions, 2013 to present.

HONORS, SCHOLARSHIPS AND FELLOWSHIPS

Advanced Researcher Fellowship, Swiss National Science Foundation, 1978-1980.

Dean's Research Professorship, Ohio State University, Spring 1984.

Pacesetter Research Award, Ohio State University, April 1986.

President-Elect (1993) and President (1994), International Economics and Finance Society.

Docteur Honoris Causa, University of Neuchâtel, Switzerland, 1998.

Eastern Finance Association Scholar Award, 1998.

Selected keynote speeches: Asia-Pacific Finance Association, Bank of the Netherlands Governance Conference, Bocconi Derivatives Annual Conference, Drexel Corporate Governance Conference, Eastern Finance Association, European Corporate Finance Institute, European Finance Association, Financial Management Association, European Financial Management Association, Financial Management Association European Conference, FDIC Annual Conference, Rising Stars Conference, Fourth Annual Conference on Asia-Pacific Financial Markets of the Korean Securities Association, French Finance Association, German Finance Association, Infiniti Conference, Notre Dame/SEC Conference, Northern Finance Association, Swiss Banking Association 100th Anniversary Conference, Western Finance Association.

Assurant Lecture, Georgia Tech University, 2004.

Fellow, Financial Management Association, 2000.

Appendix A

Fellow, American Finance Association, 2005.

Fellow, European Corporate Governance Institute, 2005.

Vice-President (2002), Program Chair, (2003), President (2004), Western Finance Association.

Vice-President (2002), President-elect (2003), President (2004), American Finance Association.

Who's Who in Banking and Finance; Who's Who in Economics.

Jensen Prize for best article in Corporate Finance in the Journal of Financial Economics, 2000, 2008; runner-up, 2011.

William F. Sharpe Award for the best paper published in the Journal of Financial and Quantitative Analysis during the year 2003.

Selected by the magazine Treasury and Risk Management as one of the 100 most influential people in finance (June 2004).

René M. Stulz Scholar Development Fund, created in 2005 by former Ph.D. students.

Fama/DFA Prize for best article in Capital Markets and Asset Pricing in the Journal of Financial Economics, 2005.

Nominated for a Brattle Prize for best paper in Corporate Finance in the Journal of Finance in 2005.

Risk Who's Who, Charter Member, 2006.

Best paper, First Asian-Pacific Capital Markets Conference, Seoul, 2006.

Outstanding Academic Contribution to Corporate Governance Award, Drexel University, 2009.

Risk Manager of the year award, Global Association of Risk Professionals, 2009.

Swiss Finance Institute/Banque Privée Espirito Santo Prize 2010.

Trailblazer in Finance Award, 2014.

CONGRESSIONAL TESTIMONY

"Over-the-Counter Derivatives Markets Act of 2009," testimony to the House of Representatives Committee on Financial Services, 2009.

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"Oversight of the Mutual Fund Industry: Ensuring Market Stability and Investor Confidence," Subcommittee on Capital Markets and Government Sponsored Enterprises, House of Representatives Committee on Financial Services, 2011.

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Risk Management and Derivatives, Southwestern College Publishing, 2003.

Handbook of the Economics of Finance, volume 1, edited with George Constantinides and Milton Harris, North-Holland, 2003.

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International Capital Markets, 3 volumes, edited with Andrew Karolyi, Edward Elgar, 2003.

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"A Model of International Asset Pricing," Journal of Financial Economics, 1981, v9(4), 383-406.

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"On the Determinants of Net Foreign Investment," Journal of Finance, 1983, v38(2), 459-468.

"The Demand for Foreign Bonds," Journal of International Economics, 1983, v15(3/4), 225-238.

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"Currency Preferences, Purchasing Power Risks and the Determination of Exchange Rates in an Optimizing Model," Journal of Money, Credit and Banking, 1984, v16(3), 302-316; reprinted in Monetary Policy and Uncertainty, Manfred J. M. Neumann, ed., Nomos, 1986.

"Pricing Capital Assets in an International Setting: An Introduction," Journal of International Business Studies (Winter 1984), 55-73; reprinted in International Financial Management: Theory and Applications, Donald R. Lessard, ed., John Wiley & Sons, 1985.

"Macroeconomic Time-Series, Business Cycles and Macroeconomic Policies," with Walter Wasserfallen, Carnegie-Rochester Conference Series on Public Policy (Spring 1985), 9-55.

"An Analysis of Secured Debt," with Herb Johnson, Journal of Financial Economics, 1985, v14(4), 501-522, reprinted in The Debt Market, vol. 3, Steve A. Ross, editor, Edward Elgar, 2000.

"The Determinants of Firm's Hedging Policies," with Clifford W. Smith, Journal of Financial and Quantitative Analysis, 1985, v20(4), 391-406; reprinted in Studies in Financial Institutions: Commercial Banks, C. James and C.W. Smith, eds., McGraw Hill, 1993, and in Corporate Hedging in Theory and Practice: Lessons from Metallgesellschaft, Christopher L. Culp and Merton H. Miller, eds., Risk Publications, London, 1999.

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"Risk Bearing, Labor Contracts and Capital Markets," with Patricia B. Reagan, Research in Finance, 1986, v6, 217-232.

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"Real Exchange Rate Dynamics and the Financial Theory of the Trading Firm," in Recent Developments in International Banking and Finance, S. Khoury and A. Ghosh, eds., Probus Publishing Company,1989, v3, 247-262.

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"Why are Foreign Firms that List in the U.S. Worth More?" with Craig Doidge and Andrew Karolyi, Journal of Financial Economics, 2004, v71(2), 205-238.

"Daily Cross-Border Flows: Pushed or Pulled?," with Federico Nardari and John Griffin, Review of Economics and Statistics, 2004, v86(3), 641-657.

"Firm Size and the Gains from Acquisitions," with Sara B. Moeller and Frederik P. Schlingemann, Journal of Financial Economics, 2004, v73, 201-228.

"Should we Fear Derivatives?" Journal of Economic Perspectives, 2004, v18(3), 173-192; reprinted in The ICFAI Journal of Derivatives Markets, 2005, v2(1), 42-53.

"Wealth Destruction on a Massive Scale? A Study of Acquiring-Firm Returns in the Recent Merger Wave," with Sara B. Moeller and Frederik P. Schlingemann, Journal of Finance, 2005, v60(2), 757-782.

"Do Domestic Investors have an Edge? The Trading Experience of Foreign Investors in Korea," with Hyuk Choe and Bong-Chan Kho, Review of Financial Studies, 2005, v18(3),795-829.

"The Limits of Financial Globalization," Journal of Finance, 2005, v60(4), 1595-1638; reprinted in Journal of Applied Corporate Finance, 2007, v19(1), 8-15.

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"Do Investors Trade more when Stocks have Performed Well? Evidence from 46 Countries," with John M. Griffin and Federico Nardari, Review of Financial Studies, 2007, v20(3), 905-951.

"Why Do Firms Become Widely Held? An Analysis of the Dynamics of Corporate Ownership," with Jean Helwege and Christo Pirinsky, Journal of Finance, 2007, 62 (3), 995-1028.

"Hedge Funds: Past, Present, and Future," Journal of Economic Perspectives, 2007, v21(2), 175-194.

"The Economics of Conflicts of Interests in Financial Institutions," with Hamid Mehran, Journal of Financial Economics, 2007, v85(2), 267-296.

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"Why Do Countries Matter so much for Corporate Governance?" with Craig Doidge and Andrew Karolyi, Journal of Financial Economics, 2007, v86, 1-39.

"How do Diversity of Opinion and Information Asymmetry Affect Acquirer Returns?" with Sara B. Moeller and Frederik P. Schlingemann, Review of Financial Studies, 2007, v20(6), 2047-2078.

"Do Local Analysts know more? A Cross-Country Study of Performance of Local Analysts and Foreign Analysts," with Kee-Hong Bae and Hongping Tan, Journal of Financial Economics, 2008 v88(3), 581-606.

"Why Do Private Acquirer Pay so Little Compared to Public Acquirers?" with Leonce L. Bargeron, Frederik P. Schlingemann, and Chad J. Zutter, Journal of Financial Economics, 2008, v89(3), 375-390

"Risk Management Failures: What Are They and When Do They Happen?" Journal of Applied Corporate Finance, 2008, v20, No. 4, 39-48.

"Private Benefits of Control, Ownership, and the Cross-Listing Decision," with Craig Doidge, G. Andrew Karolyi, Karl V. Lins, and Darius P. Miller, Journal of Finance, 2009, v64, 425-466.

"Has New York Become Less Competitive than London in Global Markets? Evaluating Foreign Listing Choices Over Time," with Craig Doidge, and G. Andrew Karolyi, Journal of Finance Economics, 2009, v91, No. 3, 253-277.

"Differences in Governance Practices between U.S. and Foreign Firms: Measurement, Causes, and Consequences," with Reena Aggarwal, Isil Erel, and Rohan Williamson, Review of Financial Studies, 2009, v22(8), 3171-3209.

"Managerial Ownership Dynamics and Firm Value," with Rüdiger Fahlenbrach, Journal of Financial Economics, 2009, v92(3), 342-361.

"How Much Do Banks Use Credit Derivatives to Hedge Loans?" with Bernadette Minton and Rohan Williamson, Journal of Financial Services Research, 2009, v35(1), 1-31.

"Securities Laws, Disclosure, and National Capital Markets in the age of Financial Globalization," Journal of Accounting Research, 2009, v47(2), 349-390.

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"Financial Globalization, Governance, and the Evolution of the Home Bias," with Bong-Chan Kho and Francis E. Warnock, Journal of Accounting Research, 2009, v47(2), 597-635.

"Seasoned Equity Offerings, Market Timing and the Corporate Lifecycle," with Harry DeAngelo and Linda DeAngelo, Journal of Financial Economics, 2010, v95(3), 275-295.

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"Why do Firms Appoint CEOs as Outside Directors?" with Rüdiger Fahlenbrach and Angie Low, Journal of Financial Economics, 2010, v97(1), 12-32.

"Credit Default Swaps and the Credit Crisis," Journal of Economic Perspectives, 2010, v.24(1), 73-92.

"Why Do Foreign Firms Leave U.S. Equity Markets?," with Craig Doidge and G. Andrew Karolyi, Journal of Finance, 2010, v.65(4), 1507-1553.

"Hedge Fund Contagion and Liquidity Shocks," with Nicole M. Boyson and Christof W. Stahel, Journal of Finance, 2010, v65(5), 1789-1816.

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"Why Are U.S. Stocks More Volatile?," with Söhnke M. Bartram and Gregory Brown, Journal of Finance, 2012, v67(4), 1329-1370.

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"Access to Capital, Investment, and the Financial Crisis," with Kathleen Kahle, Journal of Financial Economics, 2013, v110(2), 280-299.

"The U.S. Left Behind? Financial Globalization and the Rise of IPOs Outside the U.S.," with Craig Doidge and G. Andrew Karolyi, Journal of Financial Economics, 2013, v110(3), 546-573.

"Why Did Holdings of Highly – Rated Securitization Tranches Differ So Much Across Banks?" with Isil Erel and Taylor Nadauld, The Review of Financial Studies, 2014, v27(2), 404-453.

"Liquid-Claim Production, Risk Management, and Bank Capital Structure: Why High Leverage is Optimal for Banks," with Harry DeAngelo, Journal of Financial Economics, forthcoming.

"Governance, Risk Management, and Risk-Taking in Banks," Economic Policy Review, Federal Reserve Bank of New York, forthcoming.

Appendix A

PROFESSIONAL JOURNAL ARTICLES, BOOK REVIEWS, NOTES AND COMMENTS

Review of "Managing Foreign Exchange Risk," Richard J. Herring, ed., Journal of Money, Credit and Banking (February 1985), 124-125.

"On Capital Mobility in the World Economy," Carnegie-Rochester Conference Series on Public Policy (Spring, 1986), 105-114.

"Portfolio Management in International Capital Markets," Financial Markets and Portfolio Management (1, 1986), 18-23.

"Portfolio Insurance, Program Trading and the Crash of 1987," Financial Markets and Portfolio Management (1, 1988), 11-22.

"SMI Futures," with T. Stucki and W. Wasserfallen, Financial Markets and Portfolio Management (4, 1989), 288-300.

"Benefits of International Diversification with Daily Data: The Case of Pacific-Basin Stock Markets," with Warren Bailey, Journal of Portfolio Management (4,1990), 57-61.

"Portfolio Insurance with Options and Futures on the SMI," with T. Stucki and W. Wasserfallen, Financial Markets and Portfolio Management (2,1990), 99-115.

"Securities Transaction Taxes: Lessons from the International Experience," in The Globalization of Equity Markets, Jeffrey Frankel, ed., University of Chicago Press, 1994.

"Identifying and Quantifying Exposures," with Rohan Williamson, in Financial Risk and the Corporate Treasury: New Developments in Strategy and Control," Robert Jameson, ed., Risk Publications, London, 1997, 33-51. Reprinted in Corporate Risk: Strategies and Management, Gregory W. Brown and Donald H. Chew, eds., Risk Publications, London, 1999. Pre-publication Working Paper

"What's Wrong with Modern Capital Budgeting?," Financial Practice and Education, Fall/Winter 1999, p.5-9.

"Diminishing the Threats to Shareholder Wealth," Financial Times, Mastering Risk Series, April 25, 2000.

"Why Risk Management is not Rocket Science," Financial Times, Mastering Risk Series, June 27, 2000.

"An Emotional High for Stocks?," a review of "Irrational Exuberance" by Robert J. Shiller, Science (June 30, 2000), 2323.

"Demystifying Financial Derivatives," The Milken Institute Review, Third Quarter 2005, 20-31.

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"Merton Miller," New Palgrave Dictionary, 2006.

"Financial Derivatives: Lessons from the Subprime Crisis," The Milken Institute Review, First Quarter 2009, 59-70.

"Six Ways Companies Mismanage Risk," Harvard Business Review, February 2009, v87(3), 86-94.

"In Defense of Derivatives and How to Regulate Them," Wall Street Journal, April 7, 2009.

SELECTED RESEARCH IN PROGRESS AND WORKING PAPERS

"Why Do Banks Practice Regulatory Arbitrage? Evidence from Usage of Trust Preferred Securities" (with Nicole Boyson and Rüdiger Fahlenbrach).

"Is sell-side research more valuable in bad times?" (with Roger Loh).

"Limited Managerial Attention and Corporate Aging" (with Claudio Loderer and Urs Waelchli).

"Do Firms Issue More Equity when Markets are More Liquid?" (with Dimitrios Vagias and Mathijs A. van Dijk).

"Does Target CEO Retention in Acquisition Involving Private Equity Acquirers Harm Target Shareholders?" (with Leonce L. Bargeron, Frederik P. Schlingemann, and Chad J. Zutter).

"Did Capital Requirements and Fair Value Accounting Spark Fire Sales in Distressed Mortgage-Backed Securities?" (with Craig Merrill B. Merrill, Taylor D Nadauld, and Shane M. Sherlund).

"Do U.S. Firms Hold More Cash?" (with Lee Pinkowitz and Rohan Williamson).

"Corporate Acquisitions, Diversification, and the Firm's Lifecycle" (with Asli M. Arikan).

"Globalization, Governance, and the Returns to Cross-Border Acquisitions" (with Jesse Ellis, Sara B. Moeller, and Frederik P. Schlingemann).

"The Dark Side of Outside Directors: Do they Quit When They are Most Needed?" (with Rüdiger Fahlenbrach and Angie Low).

"Shareholder Wealth and Firm Risk" (with Hyun-Han Shin).

"Firm value, Risk, and Growth Opportunities" (with Hyun-Han Shin).

"Earnings, Growth, and Acquisitions" (with Frederik Schlingemann and Sara Moeller).

"Financing Flows" (with Dong Lee and Han Shin).

Appendix A

EDITORIAL AND REFEREEING ACTIVITIES

Advisory Editor, Journal of Investment Management, 2003 to present.

Advisory Editor, Journal of Financial Economics, 2000 to present.

Advisory Editor, Journal of Financial Services, 1999 to present.

Editor, Journal of Finance, 1988 to 2000.

Editor, Corporate Finance Abstracts, Social Science Research Network, 1998 to present.

Editor, Journal of Financial Economics, 1982 to 1987.

Board of Editors, Journal of Banking and Finance, 2008.

Co-Editor, Banking and Financial Institutions Abstracts, Social Science Research Network, 1998 to present.

Co-Editor, Financial Markets and Portfolio Management, 1999 to present.

Associate Editor, Journal of Risk, 2006 to present.

Board of Editors, Japan and the World Economy, 2006 to present.

Advisory Editor, The Review of Finance, 2003 to 2009.

Advisory Editor, Journal of Economic Perspectives, 2006 to 2008.

Associate Editor, Journal of Economic Perspectives, 2003 to 2005.

Associate Editor, Journal of Financial Abstracts, 1994 to 1998.

Associate Editor, Journal of Financial Economics, 1988 to 1999.

Associate Editor, Journal of International Finance and Accounting, 1988 to present.

Associate Editor, Global Finance Journal, 1988 to present.

Associate Editor, Journal of International Financial Markets, Institutions and Money, 1989 to present.

Associate Editor, Journal of Fixed Income, 1991 to present.

Associate Editor, Journal of International Trade and Finance, 1992 to present.

Appendix A

Associate Editor, Journal of Financial and Quantitative Analysis, 1983-1985.

Acted as an ad hoc referee for AER, JIE, JAE, JFE, JME, JMCB, JFQA, QJE, JF, JB, JPE, Canadian Journal of Economics, Management Science, Marketing Science, Journal of International Money and Finance, Journal of International Business Studies, the Canadian NSF and the NSF.

Editorial Board, Journal of Financial Intermediation, 2013 to present.

Appendix B

REPORTS AND PRIOR TESTIMONY OF RENÉ M. STULZ

Case Name:	In Re Moody's Corporation Securities Litigation
Case No.:	07-cv-8375-GBD (United State District Court for the Southern District of New York)
Date of Testimony:	May 2010 (Report), August 2010 (Deposition), October 2010 (Reply), June 2012 (Report)

Case Name:	Duration Capital Management Advisors, Inc. v. J.P. Morgan Securities, Inc. et al.
Case No.:	090400531 (Commonwealth of Pennsylvania, Court of Common Pleas, Philadelphia County, Commerce Program, April Term,
Date of Testimony:	January 2011 (Report), April 2011 (Deposition), June 2011 (Supplemental Report)

Case Name:	ABN AMRO BANK N.V., et al. against Eric Dinallo et al.
Case No.:	Index No.: 601846/09 Supreme Court of the State of New York, County of New York
Date of Testimony:	March 2011 (Affidavit), July 2011 (Deposition), March 2012 (Supplemental Affidavit), April 2012 (Deposition)

Case Name:	Allied Irish Banks, p.l.c., v. Bank of America, N.A., and Citibank N.A.
Case No.:	Index No. 03 Civ. 3748 (DAB) (GWG) (United States District Court, Southern District of New York)
Date of Testimony:	October 2011 (Report), December 2011 (Deposition), March 2012 (Declaration)

Case Name:	Trustees of the Local 464A United Food and Commercial Workers Union Pension Fund et al. v. Wachovia Bank, N.A., et al.
Case No.:	Civil Action No.: 2:09-cv-00668 (United States District Court, District of New Jersey)
Date of Testimony:	December 2011 (Report), March 2012 (Deposition)

Case Name:	In Re Bank of America Corp. Securities, Derivative, and Employee Retirement Income Security Act (ERISA) Litigation
Case No.:	No. 09 MDL 2058 (PKC) (United States District Court, Southern District of New York)
Date of Testimony:	April 2012 (Report), May 2012 (Deposition)

Appendix B

Case Name:	In Re REFCO Inc. Securities Litigation
Case No.:	07-MDL-1902 (United States District Court, Southern District of New York)
Date of Testimony:	August 2012 (Report), September 2012 (Deposition)

Case Name:	Denver Employees Retirement Plan against JPMorgan Chase Bank, N.A.
Case No.:	Index No. 650320/2010 (Supreme Court of the State of New York, County of New York)
Date of Testimony:	August 2012 (Report), October 2012 (Deposition)

Case Name:	Comcast Corporation and Subsidiaries v. Commissioner of Internal Revenue
Case No.:	Dockets 1860-11 and 2204-11, Judge Marvel
Date of Testimony:	November 2012 (Report), December 2012 (Reply)

Case Name:	Casino Guichard-Perrachon et al. v. Abilio Dos Santos Diniz et al.
Case No.:	ICC Case No. 17977/CA (C-18055/CA)
Date of Testimony:	November 2012 (Report), June 2013 (Reply)

Case Name:	Dodona I, LLC et al. v. Goldman Sachs & Co., et al.
Case No.:	Case No. 10-CV-07497 (United States District Court, Southern District of New York)
Date of Testimony:	May 2013 (Report), June 2013 (Deposition), December 2013 (Report), February 2014 (Deposition)

Case Name:	In re BP p.l.c. Securities Litigation
Case No.:	Case No. 4:10-MD-02185 (United States District Court, Southern District of Texas, Houston Division)
Date of Testimony:	August 2013 (Report), September 2013 (Deposition), November 2013 (Report), February 2014 (Report), March 2014 (Deposition)

Case Name:	The People of the State of New York v. Bank of America et al.
Case No.:	Index No. 450115/2010 (Supreme Court of the State of New York, County of New York)
Date of Testimony:	November 2013 (Report)

Case Name:	In Re China MediaExpress Inc.
Case No.:	Case No. 11 Civ. 0804 (VM/GWG), United States District Court, Southern District of New York
Date of Testimony:	April 2014 (Report), May 2014 (Deposition)

Appendix B

Case Name:	Postova Banka, A.S. and Istrokapital SE, Claimants, and The Hellenic Republic, Respondent
Case No.:	Icsid Case No. ARB/13/8
Date of Testimony:	June 2014 (Report), September 2014 (Hearing)
Case Name:	Plumbers & Pipefitters National Pensions Fund, et al. v. Michael J. Burns et al.; Hawaii Ironworkers Annuity Trust Fund v. Bernard N. Cole et al.
Case No.:	No. 3; 10-cv-00371-JGC (United States District Court, Northern District of Ohio)
Date of Testimony:	October 2014 (Report)
Case Name:	In Re Delcath Systems, Inc. Securities Litigation
Case No.:	Case No. 13-CV-3116 (LGS) (United States District Court, Southern District of New York)
Date of Testimony:	December 2014 (Report), January 2015 (Deposition)
Case Name:	National Australia Bank Limited and TSL (USA), Inc., v. Goldman Sachs & Co.
Case No.:	FINRA Dispute Resolution No. 12-04099
Date of Testimony:	February 2014 (Report), March 2014 (Report), April 2014 (Arbitration Hearing)

Appendix C

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BEAR 00128463
BEAR 00133913
BEAR 00203369
BEAR 00203371
BEAR 00205001
BEAR 00211158
BEAR 00213658
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BEAR 00219134
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Appendix C

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Appendix C

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Appendix C

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Appendix C

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BS-SEC 1693503
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Appendix C

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